

(NASA-SP-7011(261)) AEROSPACE MEDICINE AND N84-30683  
BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH  
INDEXES (SUPPLEMENT 261) (National  
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**Aerospace Medicine & Biology**  
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## ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

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IAA (A-10000 Series)	A84-30009 - A84-33162
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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 261)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in July 1984 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch

1984

**National Aeronautics and Space Administration**

Washington, DC

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 281 reports, articles and other documents announced during July 1984 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1984 Supplements.

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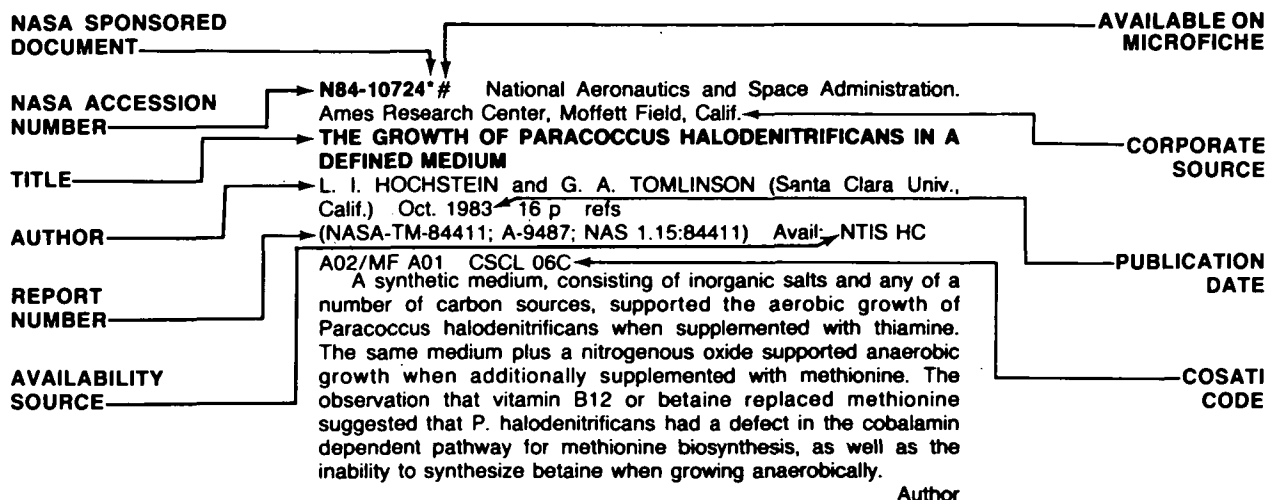
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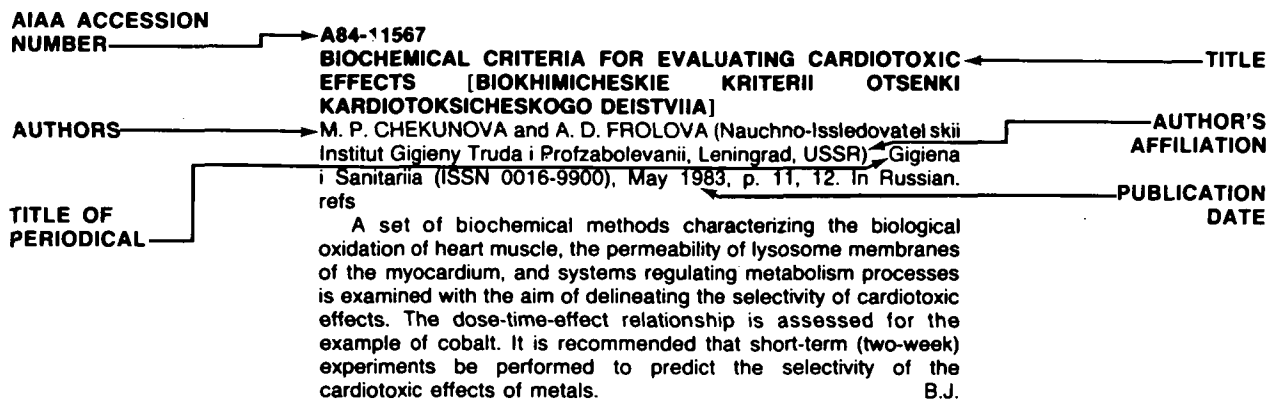
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# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 261)*

AUGUST 1984

51

## LIFE SCIENCES (GENERAL)

Includes genetics.

**A84-30009**

### **ADAPTATIONS OF SKELETAL MUSCLE TO ENDURANCE EXERCISE AND THEIR METABOLIC CONSEQUENCES**

J. O. HOLLOSZY and E. F. COYLE (Washington University, St. Louis, MO) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, April 1984, p. 831-838. Research supported by the Muscular Dystrophy Association. refs  
(Contract NIH-AG-00425; NIH-AM-18986)

Regularly performed endurance exercise induces major adaptations in skeletal muscle. These include increases in the mitochondrial content and respiratory capacity of the muscle fibers. As a consequence of the increase in mitochondria, exercise of the same intensity results in a disturbance in homeostasis that is smaller in trained than in untrained muscles. The major metabolic consequences of the adaptations of muscle to endurance exercise are a slower utilization of muscle glycogen and blood glucose, a greater reliance on fat oxidation, and less lactate production during exercise of a given intensity. These adaptations play an important role in the large increase in the ability to perform prolonged strenuous exercise that occurs in response to endurance exercise training.

Author

**A84-30011**

### **EFFECTS OF PYRIDOSTIGMINE ON ABILITY OF RATS TO WORK IN THE HEAT**

R. FRANCESCONI, R. HUBBARD, and M. MAGER (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, April 1984, p. 891-895. refs

Adult, male rats (300-325 g) were treated with pyridostigmine bromide ( $n = 22$ ) or saline ( $n = 22$ ) to quantitate the effects of cholinesterase inhibition (64 percent) on the ability to work (9.14 m/min, level treadmill) in the heat (35 C). Pyridostigmine-treated rats had a mean endurance of 23 min, whereas saline-treated animals ran for nearly 35 min ( $P$  less than 0.001). Rates of rectal and skin temperature increments were significantly higher ( $P$  less than 0.001) in pyridostigmine-treated rats as were water losses ( $P$  less than 0.001). Exercise in the heat to hyperthermic exhaustion effected anticipated increments in circulating urea nitrogen, creatinine, lactate dehydrogenase, and potassium levels, whereas pyridostigmine pretreatment had additive effects on lactate and creatine kinase concentrations. Additionally, pyridostigmine elicited a significant ( $P$  less than 0.01) hyperglycemia before exercise, an effect noted also with other organophosphate simulants. It is concluded that pyridostigmine-induced cholinesterase inhibition had a variety of debilitating effects during work in the heat.

Author

**A84-30016**

### **REGULATION OF FATTY ACID BIOSYNTHESIS IN RATS BY PHYSICAL TRAINING**

R. SCORPIO, R. L. RIGSBY, D. R. THOMAS, and B. D. GARDNER (Andrews University, Berrien Springs, MI) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, April 1984, p. 1060-1064. Research supported by Andrews University. refs

The hepatic fatty acid biosynthesis activity and the catalytic activity of acetyl-CoA carboxylase were measured in rats exercised by swimming and in nonexercised controls. Untrained rats were also exposed to a single exercise session. It was found that exercise inhibited hepatic fatty acid biosynthesis and acetyl-CoA carboxylase activity in physically trained and untrained rats, and that this inhibitory effect was attenuated by exercise termination sooner in untrained rats than in trained rats. Possible explanations of acetyl-CoA carboxylase regulation include: (1) exercise produces a noncompetitive-type inhibitor of the enzyme, (2) exercise decreases enzyme concentration, and (3) exercise inactivates the enzyme, possibly by covalent modification. It is concluded that acetyl-CoA carboxylase may be a control site in the regulation of hepatic fatty acid biosynthesis by both physical training and acute exercise in rats.

C.M.

**A84-30334\*** Wright State Univ., Dayton, Ohio.

### **NEURAL MECHANISMS OF MOTION SICKNESS**

G. H. CRAMPTON (Wright State University, Dayton, OH) and N. G. DAUNTON (NASA, Ames Research Center, Moffett Field, CA) IN: *Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings*. Toulouse, France, Cepadues-Editions, 1983, p. 129-136. refs

The possibility that there might be a neuro-humoral cerebrospinal fluid link in motion sickness was directly tested by blocking the flow of CSF from the third into the fourth ventricle in cats. Evidence obtained thus far is consistent with the hypothesis. Cats with demonstrably sound plugs did not vomit in response to an accelerative motion sickness stimulus, whereas cats with imperfect 'leaky' plugs vomited with little or no delay in latency. Although there are several putative candidates, the identification of a humoral motion sickness substance is a matter of conjecture.

Author

**A84-30336**

### **VISUAL AND VESTIBULAR ASPECTS OF THE SELF-RIGHTING REFLEX OF THE CAT IN FREE FALL [ASPECTS VISUELS ET VESTIBULAIRES DU RETOURNEMENT CHEZ LE CHAT EN CHUTE LIBRE]**

J. CREMIEUX, B. AMBLARD, and A. MARCHAND (CNRS, Institut de Neurophysiologie et Psychophysiologie, Marseille, France) IN: *Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings*. Toulouse, France, Cepadues-Editions, 1983, p. 143-150. In French. refs

The self-righting reflex (SRR) is investigated in 5 normal cats and in 5 cats bilaterally labyrinthectomized before the age of 3 weeks, under normal light, 10-Hz strobe light, or in darkness. The animals were dropped paws-up from a height of 1.2 m, and the falls were recorded (using an IR camera for the dark trials). The ratios of correct or almost correct SRRs to the number of trials under the three light conditions were 43/45, 44/48, and 32/39 for the labyrinthectomized cats, indicating that some source of

attitude information other than visual or vestibular is used to produce the SRR in these animals. These findings are in contrast to earlier observations of cats labyrinthectomized as adults, which lacked the SRR when blindfolded. T.K.

**A84-30339****LABYRINTH AND NECK INFLUENCES ON DIFFERENT SIZE RETICULOSPINAL NEURONS**

O. POMPEIANO, D. MANZONI, U. C. SRIVASTAVA, and G. STAMPACCHIA (Pisa, Università, Pisa, Italy) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 173-181. Research supported by the Consiglio Nazionale delle Ricerche and Ministero della Pubblica Istruzione. refs

(Contract NIH-NS-07685-14)

The response of reticulospinal neurons with cell bodies in the medial medullary reticular formation and axons projecting to the lumbosacral cord to stimulation of the labyrinth and/or neck receptors is investigated experimentally in decerebrate cats. A positive correlation is found between the response gain (in impulses/sec/deg of animal tilt and/or neck rotation) and the size of the neuron (as reflected by conduction velocity) and attributed to increased density or efficacy of synaptic contacts. The larger neurons exhibit responses opposite to those of lateral vestibulospinal neurons, suggesting that the reticulospinal neurons inhibit the ipsilateral extensor motoneurons. T.K.

**A84-30340****ROLE OF DENTATE NUCLEUS AND SUBSTANTIA NIGRA IN FEEDFORWARD AND FEEDBACK CONTROL OF A POINTING MOTION [CONTROLE PROACTIF ET RETROACTIF D'UN MOUVEMENT DE POINTAGE PARTICIPATION DU NOYAU DENTÉLÉ ET DE LA SUBSTANCE NOIRE]**

E. TROUCHE, D. BEAUBATON, F. VIALLET, and E. LEGALLET (CNRS, Institut de Neurophysiologie et Psychophysiologie, Marseille, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 183-194. In French. refs

The effect of unilateral exclusion of the dentate nucleus (DN) or substantia nigra (SN) on the time of movement (TM) and error in a digital-pointing task is investigated experimentally in nine baboons. The results are resented in graphs and tables and analyzed statistically. Exclusion of the DN causes increased errors and either increases or decreases TM, while exclusion of the SN lengthens TM but does not affect the error. It is suggested that the neocerebellum exercises feedforward organizational control of the motor sequence which is then corrected by the basal ganglia. T.K.

**A84-30343\* Wisconsin Univ., Madison.****MEASUREMENT OF SPINE AND TOTAL BODY MINERAL BY DUAL-PHOTON ABSORPTIOMETRY**

R. B. MAZESS (Wisconsin, University, Madison, WI) and D. YOUNG (NASA, Ames Research Center, Moffett Field, CA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 209-214. refs

(Contract NGR-50-002-051; NAG2-166)

The use of Gd-153 dual-photon absorptiometry at 43 and 100 keV to measure individual-bone and total-body bone minerals is discussed in a survey of recent studies on humans, phantoms, and monkeys. Precision errors of as low as 1 percent have been achieved in vivo, suggesting the use of sequential measurements in studies of immobilization and space-flight effects. T.K.

**A84-30347****PHYSIOLOGICAL MECHANISMS OF ADAPTATION OF THE ANIMAL MUSCULO-SKELETAL SYSTEM TO ZERO-G**

V. S. OGANOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 239-245. refs

The effects of weightlessness on the bones of mammals are examined in a review comparing the results of Cosmos-biosatellite rat experiments with space-flight and bed-rest studies in humans. The role of the skeletal muscles is emphasized in explaining the different responses of the rat tibia and humerus to zero-G. T.K.

**A84-30348****MECHANICAL MEDIATOR OF BONE DEMINERALIZATION IN WEIGHTLESSNESS - A BIOELECTROMECHANIC HYPOTHESIS**

M. G. HINSENKAMP (Hopital Universitaire Erasme, Brussels, Belgium) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 247-253. refs

Experimental evidence for a bioelectrochemical mechanism in bone remodeling and growth is presented, summarizing recent studies on rats and on embryonic tissues from chickens and mice. The implications for the decalcification process in weightlessness are indicated. T.K.

**A84-30353****RAT MODEL OF TIBIAL UNLOADING AND OVER-LOADING**

M. HINSENKAMP (Hopital Universitaire Erasme, Brussels, Belgium), A. SCHOUTENS (Hopital Universitaire Erasme; Hopital Universitaire Brugmann, Brussels, Belgium), M. VERHAS, and A. VERSCHAEREN IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 291-297. refs

To determine the effects of bone strain modifications in rats, mechanical unloading and over-loading of rat tibia were studied. After sectioning the joint ligaments and the patellar-tendon of the right femorotibial joint, rats were allowed free movement and subsequently sacrificed after 15, 30, and 45 days. Parameters examined include length, volume, density, calcium content, and 72 hour Ca-45 clearance by bone and blood flow. Unloading of the tibia did not influence the axial growth or the Ca-45 clearance, but it did attenuate bone density and Ca concentration. Over-loading of the tibia decreased axial growth, bone volume, and Ca-45 clearance, but bone density and Ca concentration increased or remained unchanged. It is suggested that an increased rate of bone resorption and an unmodified rate of bone formation occurs in the unloaded bone, and that a decrease in bone formation occurs simultaneously with bone resorption in the over-loaded bone. C.M.

**A84-30355****BONE REMODELING AND ARTIFICIAL GRAVITY AUGMENTATION [REMODELAGE OSSEUX ET AUGMENTATION ARTIFICIELLE DE PESANTEUR]**

C. NOGUES, M. PEUCHMAUR, P. QUANDIEU, and P. PESQUIES (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 307-313. In French. refs

The effects of 18-day 2G centrifugation on bone-formation processes are investigated experimentally in 10 pathogen-free female Wistar rats weighing about 203 g; 10 similar rats placed in a cage at the base of the centrifuge serve as controls. Urinary Ca and hydroxyproline, body weight, and the length of the femur are measured; and histological studies of bone, cartilage, and viscera are performed. The results are analyzed using the basic-multicellular-unit model of bone remodeling of Frost (1969). A shortening of the femurs, alterations in cartilage growth, and reduction in bone volume without increased osteoclast activity are observed in the centrifuged animals, along with increased adrenal activity and reduced opposition rate. These results are attributed

to cortisone-induced osteoporosis as a response to the stress experienced by the experimental animals, and it is suggested that this effect masks any bone-remodeling response to increased gravity. The findings should also be considered when evaluating microgravity experiments. T.K.

**A84-30356\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**CARDIOVASCULAR RESPONSES TO HYPOGRAVIC ENVIRONMENTS**

H. SANDLER (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 317-333. refs

The cardiovascular deconditioning observed during and after space flight is characterized in a review of human space and simulation studies and animal simulations. The various simulation techniques (horizontal bed rest, head-down tilt, and water immersion in man, and immobilization of animals) are examined, and sample results are presented in graphs. Countermeasures such as exercise regimens, fluid replacement, drugs, venous pooling, G-suits, oscillating beds, electrostimulation of muscles, lower-body negative pressure, body-surface cooling, and hypoxia are reviewed and found to be generally ineffective or unreliable. The need for future space experimentation in both humans and animals is indicated. T.K.

**A84-30360\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**ANIMAL EXPERIMENTATION IN SPACELAB - PRESENT AND FUTURE U.S. PLANS**

W. E. BERRY and C. C. DANT (NASA, Ames Research Center, Moffett Field, CA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 381-391.

Current development of life-sciences hardware and experiments for the fourth Spacelab mission in the Life Sciences Flight Experiments Program at NASA Ames is reviewed. The research-animal holding facility, the general-purpose work station, and the life sciences laboratory equipment are characterized, and the 14 Ames projects accepted for the mission are listed and discussed. Several hardware systems and experimental procedures will be verified on the Spacelab-3 mission scheduled for late 1984. T.K.

**A84-30370**

**CONTINUOUS MEASUREMENT OF THE CEREBRAL-TISSUE BLOOD SUPPLY IN THE ANIMAL [EVALUATION EN CONTINUU DE L'IRRIGATION SANGUINE TISSULAIRE CEREBRALE CHEZ L'ANIMAL]**

B. ROUSSEL (Service de Santes Armees, Centre de Recherches, Lyon, France), A. DITTMAR, and G. DELHOMME (Lyon I, Universite, Lyon, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 479-485. In French. refs

A technique for the continuous monitoring of cerebral blood flow in conscious animals by the thermal-clearance method is proposed, and preliminary results from the cat and the rat are shown. A probe of 800-micron external diameter comprising a thermistor and a heating element in a gold-foil-covered glass casing is fixed to the cranium by a steel tube and permits simultaneous measurement of the temperature and thermal conductivity of a 4-mm-diameter sphere of tissue every 6 sec. The method used for calculating cerebral blood flow from the thermal conductivity is explained, and measurements of animal responses to hypercapnia and various drugs are shown to be in good agreement with those obtained using an Xe-133-clearance technique. The use of the probe to study the effects of microgravity on the cerebral circulation is suggested. T.K.

**A84-30453**

**THERMAL EFFECT OF LASER RADIATION ON MULTILAYER EYE TISSUES [TEPLOVOE VOZDEISTVIE LAZERNOGO IZLUCHENIA NA MNOGOSLOINNYE TKANI GLAZA]**

A. S. PODOLTSEV and G. I. ZHELTOV Zhurnal Prikladnoi Spektroskopii (ISSN 0514-7506), vol. 40, Feb. 1984, p. 207-211. In Russian. refs

**A84-30597**

**CRITERIA OF BACTERIORHODOPSIN INCORPORATION INTO A BILAYER LIPID MEMBRANE [KRITERII VSTRAIVANIYA BAKTERIORODOPSINA V BISLOINUIU LIPIDNUIU MEMBRANU]**

V. M. MIRSKII and V. S. SOKOLOV (Akademiia Nauk SSSR, Institut Elektrokhemii, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Mar.-Apr. 1984, p. 246-249. In Russian. refs

The photocurrent of a planar bilayer lipid membrane (BLM), containing bacteriorhodopsin (BR) both in the proteoliposomes adsorbed on it and in the bilayer itself, is investigated. Equations are introduced which show that, when BR is contained only in the BLM, the initial photocurrent observed with the turning on of a light is the same as that of the steady-state. For the case when BR is contained only in the adsorbed liposomes, turning on the light initiates transient processes. For both incorporated and adsorbed proteoliposomes, the photocurrent is represented by the sum of the two above responses. The variation of steady-state photocurrents with the variation of dark membrane conductance was also analyzed. Criteria are presented which permit photoresponses to be distinguished from a small amount of BR in the BLM, with a predominant amount of BR in the adsorbed proteoliposomes. J.N.

**A84-30598**

**STUDY OF THE INCORPORATION OF BACTERIORHODOPSIN PROTEOLIPOSOMES IN BILAYER LIPID MEMBRANES - EXPERIMENT [IZLUCHENIE VSTRAIVANIYA BAKTERIORODOPSINOVYKH PROTEOLIPOSOM V BISLOINNYE LIPIDNYYE MEMBRANY - EKSPERIMENT]**

V. M. MIRSKII, V. S. SOKOLOV, E. I. MELNIK, and T. V. DIUKOVA (Akademiia Nauk SSSR, Institut Elektrokhemii, Moscow; Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniyam Khimicheskikh Soedinenii, Kupavna; Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Biofizika (ISSN 0006-3029), vol. 29, Mar.-Apr. 1984, p. 250-254. In Russian. refs

The materials and methods used for an investigation of the photoactivity of planar bilayer lipid membranes (taken from strain R Halobacterium halobium), which were modified by proteoliposomes (LS) with bacteriorhodopsin (BR), are reviewed. Several minutes after the addition of Ca(2+) ions into the lipid solution, a gradually increasing photocurrent appeared, the sign of which always corresponded to the transfer of protons in a section not containing LS. The short circuit currents were studied during the switching on and off of a light in an interval of time exceeding that of the BR photocycle, and the photocurrent dependence on an external electric field and on membrane conductance was determined. J.N.

**A84-30600**

**INFLUENCE OF OZONE ON THE PERMEABILITY OF PLANAR BILAYER LIPID MEMBRANES [VLIANIE OZONA NA PROMITSIAEMOST' PLOSKIKH BISLOINNYKH LIPIDNYKH MEMBRAN]**

G. N. SEMENKOVA, G. KEDITS, S. N. CHERENKEVICH, and A. I. KHMELNITSKII (Belorusskii Gosudarstvennyi Universitet, Minsk, Belorussian SSR) Biofizika (ISSN 0006-3029), vol. 29, Mar.-Apr. 1984, p. 323-325. In Russian. refs

**A84-30865\*** Washington Univ., St. Louis, Mo.

**SIMULATING CERTAIN ASPECTS OF HYPOGRAVITY - EFFECTS ON BONE MATURATION IN THE NONWEIGHT BEARING SKELETON**

D. J. SIMMONS, B. GRAZMAN, J. E. RUSSELL, W. V. WALKER (Washington University, St. Louis, MO), D. D. BIKLE (California, University, San Francisco, CA), and E. R. MOREY (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1080-1084. refs  
(Contract NAGW-301; NAGW-236)

For a determination of how the nonweight-bearing skeletons, i.e., lower jaws, of 41-day and 1-year old rats would respond to 10 or 14 days of partial skeletal unloading by elevating the hindquarters (PULEH), an experimental system to simulate the fluid shifts and unloading of portions of the skeleton which occur during spaceflight was developed. In comparison with the bone matrix mineralization recorded in the mandibles of rats flown in the Soviet 18.5 day Cosmos-1129 mission, the PULEH studies failed to produce spaceflight-like maturation defects. J.N.

**A84-30866**

**HYPO- AND HYPERGLYCEMIA IN RATS - EFFECTS ON ENDURANCE AND HEAT/EXERCISE INJURY**

R. FRANCESCONI and M. MAGER (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1085-1089. refs

Rats were made hypoglycemic or hyperglycemic with insulin or glucose, and were exercised in heat to hyperthermic exhaustion in order to determine whether circulating glucose levels affected exercise performance and the severity of hyperthermic injury. Hyperglycemic rats, exhibited greater endurance than controls, and increased hematocrit levels and higher post-run lactate levels than controls or insulin-treated rats. Other parameters examined included pre-run and post-run glucose levels, and potassium, urea, nitrogen, and creatinine concentrations. It was concluded that hyperglycemic rats exhibited increased endurance, but that the minimum 50 percent mortality rate in all groups was unaffected by circulating glucose levels. C.M.

**A84-30867**

**RELATIONSHIP BETWEEN RAT HEAT STRESS MORTALITY AND ALTERATIONS IN RETICULOENDOTHELIAL CARBON CLEARANCE FUNCTION**

D. A. DUBOSE, J. MCCREARY, L. SOWDERS (U.S. Army, Research Institute of Environmental Medicine, Natick, MA), and L. GOODE (Delmed, Inc., Canton, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1090-1095. refs

**A84-30869**

**EVOKED POTENTIAL STUDIES OF THE EFFECTS OF IMPACT ACCELERATION ON THE MOTOR NERVOUS SYSTEM**

B. SALTZBERG, W. D. BURTON, JR., N. R. BURCH (Texas Research Institute of Mental Sciences, Houston, TX), C. L. EWING, D. J. THOMAS, M. WEISS, M. D. BERGER, E. JESSOP (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA), A. SANCES, P. R. WALSH (Wisconsin, Medical College, Milwaukee, WI) et al. (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1100-1110.  
(Contract N00014-76-C-0911)

The initial results of a continuing investigation into the effects of various levels of impact acceleration on the functional integrity of the motor nervous system are summarized. The results are based on the measurement of alterations in neural transmission along the motor pathway of the Rhesus monkey as revealed by latency and amplitude changes in the motor pathway evoked potential (EP) following the delivery of various levels of impact acceleration to a test vehicle. The EPs were produced by electrical stimulation of and recording from the motor pathway of

experimental animals subjected to -Y (lateral impact) acceleration and animals subjected to -X (frontal impact) acceleration. High resolution latency and amplitude measures of the EP recorded from these animals before and after impact were tracked so that the time course of recovery of nerve propagation following impact could be accurately assessed. Analysis of these EP measures revealed that the time course of recovery to pre-impact values is directly related to the intensity of the acceleration impulse delivered to the test vehicle.

Author

**A84-30873\***

National Aeronautics and Space Administration, Washington, D. C.

**SPACELAB MISSION 4 - THE FIRST DEDICATED LIFE SCIENCES MISSION**

T. W. PERRY (NASA, Life Sciences Div., Washington, DC) and D. H. REID (GE Management and Technical Services Co., Arlington, VA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1123-1128. refs

Plans for the first Spacelab-4 mission dedicated entirely to the life sciences, are reviewed. The thrust of the scientific mission scheduled for late 1985 will be to study the acute effects of weightlessness on living systems, particularly humans. The payload of the Spacelab compartment will contain 24 experiments of which approximately half will involve humans. Among the major areas of interest are cardiovascular and pulmonary function, vestibular function, renal and endocrine physiology, hematology, nitrogen balance, immunological function, the gravitational biology of plants, inflight fertilization of frogs' eggs and the effects of zero gravity on monkeys and rats. In selecting the array of experiments an effort was made to combine investigations with complementary scientific objectives to develop animal models of human biological problems. I.H.

**A84-30974**

**CENTRAL REGULATION OF BLOOD CIRCULATION DURING TRAUMA AND HEMORRHAGE [TSENTRAL'NAIA REGULATSIIA KROVOOBRAZHCHENIIA PRI TRAVMAKH I KROVOPOTERE]**

V. B. LEMUS Leningrad, Izdatel'stvo Meditsina, 1983, 224 p. In Russian. refs

The pathogenetic role of the vasomotor center (VMC) at various stages of shock is discussed according to the philosophical, physiological, pharmacological, neurosurgical, and mathematical aspects of the problem. The general pathogenesis of hemodynamic disorders resulting from hemorrhage and traumatic shock is reviewed. An investigation of the consequences of damage to the VMC in shock includes typical metabolic disorders and pathomorphological changes in the brain. The role of cardiovascular reflexes in the regulation of blood circulation during shock is discussed, as is the functional state of various levels of the VMC and the reflex regulation of the vascular tension. Other topics include the bioelectrical activity of the VMC; the excitability of the VMC and consequences of its stimulation; neurotropic vasoactive preparations in the prevention and cure of shock; and a systematic analysis of the central regulation of blood circulation in shock.

J.N.

**A84-31018**

**REFLEX THEORY OF HIGHER NERVOUS ACTIVITY [REFLEKTORNAIA TEORIYA VYSSHEI NERVOI DEIATEL'NOSTI]**

E. A. ASRATIAN Moscow, Izdatel'stvo Nauka, 1983, 328 p. In Russian. refs

This volume of selected works of E.A. Asratian includes papers on the systemic quality of the operation of the cerebral hemispheres; the switching principle in conditioned reflex activity; the physiological lability of the higher central stages; compensatory functions; and the localization of cortical inhibition in the conditioned reflex arc. Also included are works on stable and local electrophysiological indicators of conditioned reflex; Pavlovian teaching on higher nervous activity and motivational behavior; and the two-way connection. J.N.

A84-31268

**ORIENTATION BANDWIDTHS OF SPATIAL MECHANISMS MEASURED BY MASKING**

G. C. PHILLIPS and H. R. WILSON (Chicago, University, Chicago, IL) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, Feb. 1984, p. 226-232. refs (Contract NIH-EY-02158)

Orientation tuning curves were measured at 10 spatial frequencies ranging from 0.5 to 11.3 cycles per degree (cpd) using a masking paradigm. The stimuli were spatially localized test patterns of 1.0 octave bandwidth superimposed upon cosine grating masks. By using a model that corrects for the nonlinearity inherent in the masking process, the half-amplitude half-bandwidths of Cartesian-separable receptive fields that may underlie orientation selectivity are obtained. Additional experiments show that the data are not compatible with separability in polar coordinates. The orientation half-bandwidths have been found to decrease somewhat with increasing spatial frequency, going from about 30 deg at 0.5 cpd to 15 deg at 11.3 cpd, for both sustained and transient forms of temporal modulation. Similar bandwidths are obtained from data where the test is oriented along 45 deg. These bandwidth estimates are shown to be consistent with subthreshold summation data as well as physiological data from monkey striate cortex. Author

A84-31373\* California Univ., Santa Barbara.

**LARVAL ADAPTATIONS AND PATTERNS OF BRACHIOPOD DIVERSITY IN SPACE AND TIME**

J. W. VALENTINE (California, University, Santa Barbara, CA) and D. JABLONSKI (Arizona, University, Tucson, AZ) Evolution (ISSN 0014-3820), vol. 37, no. 5, 1983, p. 1052-1061. Research supported by the Miller Institute for Basic Research in Science and University of California. refs (Contract NSF EAR-78-15536; NSF EAR-81-21212; NAG2-73)

Modern biodistributional patterns suggest that modes of larval development are a factor in determining the patterns of diversity in benthic invertebrates. Paleozoic brachiopods had diversity patterns suggesting that they possessed both planktotrophic and nonplanktotrophic modes. It is presently hypothesized that the planktotrophic lineages were lost to extinction, largely or entirely during the Permian-Triassic event, and that the failure of the articulate brachiopods to regain their former importance is substantially due to their nonplanktotrophic developmental mode. O.C.

A84-31476

**PLASMODIUM OF MYXOMYCETES AS AN OBJECT OF INVESTIGATION IN GRAVITATIONAL BIOLOGY [PLAZMODII MIKSOMITSETA KAK OB'YKT ISSLEDOVANIYA V GRAVITATSIONNOI BIOLOGII]**

M. G. TAIRBEKOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), S. I. BEILINA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR), D. B. LAIRAND, A. A. BUDNITSKII, and V. V. LEDNEV (Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia (ISSN 0002-3329), Mar.-Apr. 1984, p. 198-209. In Russian. refs

The development of a technique for the cultivation of the plasmodium of the slime mold, myxomycetes physarum polycephalum, for studies in weightless conditions is reviewed. The selection of the optimum experimental culture media, temperature, and humidity is described, and the maximum length of time of normal unattended development of the plasmodium in space flight was determined. The results of centrifugal testing show that variations in the magnitude and direction of the gravitational field may influence the growth dynamics and the fundamental morphofunctional characteristics of this specimen. An analysis of the results of testing on board the Cosmos-1129 biosatellite shows that the growth and locomotion of the plasmodium along the substrate are reduced in weightless conditions. It is proposed that the limitation in the growth rate and movement of cytoplasm in the slime mold cells is due to the decreased level of energy metabolism. J.N.

A84-31480

**NANOSECOND ABSORPTION SPECTROSCOPY OF BACTERIORHODOPSIN PHOTOTRANSFORMATIONS IN DRY FILMS - THE INFLUENCE OF AN EXTERNAL ELECTRIC FIELD [NANOSEKUNDAIA ABSORBTSIONNAIA SPEKTROSKOPIA FOTOPREVRASHCHENII BAKTERIORODOPSINA V SUKHIKH PLENKAKH VLIANIE VNESHNEGO ELEKTRICHESKOGO POLIA]**

S. K. CHAMOROVSKII, A. IA. PIKULENKO, E. VOZARI, G. P. BORISEVICH, A. A. KONONENKO, V. Z. PASHCHENKO, L. B. RUBIN, and A. B. RUBIN (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Akademii Nauk SSSR, Izvestiia, Serii Biologicheskaiia (ISSN 0002-3329), Mar.-Apr. 1984, p. 294-298. In Russian. refs

Pulsed laser absorption spectroscopy with 25 ns time resolution was used to study the kinetics of photochromic transformations of bacteriorhodopsin (BR) in air-dried films of purple membranes isolated from Halobacterium halobium. The action of the laser burst effected a change in the film absorption spectrum; no more than three components were present at all stages in the spectra. The BR photocycle was limited by the passage of three stages: BR570, K, and M. The decreased amplitude of the photoinduced BR transformations indicates that the applied electric field ( $E = 50-60$  MV/m) inversely transfers a part of the BR into a photochemically inactive form. However, the electric field did not influence the kinetics of the photoinduced formation of the intermediate M (half-life = 20 microseconds), measured by the absorption at 410 nm. J.N.

A84-31506

**SPIRAL ARRANGEMENT OF MUSCULAR ELEMENTS IN THE WALLS OF BLOOD VESSELS AND ITS IMPORTANCE FOR HEMODYNAMICS [SPIRAL'NOE RASPOLOZHENIE MYSHECHNYKH ELEMENTOV V STENKE KROVENOSNYKH SOSUDOV I EGO ZNACHENIE DLIA GEMODINAMIKI]**

V. V. RUPRIANOV (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 46-54. In Russian. refs

A84-31508

**THE STRUCTURE OF THE WALLS OF OSSEOUS LACUNAS DURING THEIR FORMATION [STRUKTURA STENOK KOSTNYKH LAKUN V PROTSESSE IKH FORMIROVANIYA]**

A. A. DOKTOROV and IU. I. DENISOV-NIKOLSKII (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skaia Laboratoriia Biologicheskikh Struktur, Moscow, USSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 70-79. In Russian. refs

A84-31511

**INVESTIGATION OF THE NEUROMUSCULAR SYNAPSE BY IMPROVED HISTOCHEMICAL METHODS [ISSLEDOVANIE NERVNO-MYSHECHNOGO SINAPSA USOVERSHENSTVOVANNYMI GISTOKHIMICHESKIMI METODAMI]**

N. V. VLADIEVA, V. G. KUZNETSOV, V. A. SMIRNOV, and V. I. SHCHEKOLDINA (Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 93-97. In Russian. refs

A84-31512

**PITUITARY HORMONES - REGULATORS OF MEMORY [GORMONY GIPOFIZA - REGULATORY PAMIATI]**

A. A. KAMENSKII and S. A. TITOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Priroda (ISSN 0032-874X), Sept. 1983, p. 64-73. In Russian. refs

The mechanisms by which adrenocorticotrophin, vasopressin, and oxytocin serve as regulators of memory are described. The practical applications of these hormones are considered, and it is concluded that these substances show promise as means for dealing with memory disorders. B.J.

A84-31513

**MORPHOLOGICAL CHANGES OF ERYTHROCYTES UNDER THE EFFECT OF COLD ON THE BODY [MORFOLOGICHESKIE IZMENENIYA ERITROTSITOV PRI VOZDEISTVII KHOLODA NA ORGANIZM]**

A. G. MARACHEV and A. V. KORNEV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 45, no. 9, 1983, p. 11-18. In Russian. refs

An investigation was made of the morphology of erythrocytes in inhabitants of the extreme north of the USSR and in experimental rats after prolonged exposure to cold. It is shown that the red-blood system undergoes considerable restructuring with a marked polymorphism of erythrocytes. Adaptation reactions of the body are accompanied by the simultaneous production and destruction of erythrocytes. B.J.

A84-31514

**MICROCIRCULATION AND INFLAMMATION [MIKROTSIRKULIATSIYA I VOSPALENIE]**

A. I. STRUKOV (I Moskovskii Meditsinskii Institut, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 45, no. 9, 1983, p. 73-76. In Russian. refs

A review of the literature and original observations indicate that the inflammation process involves all the components of the microcirculatory bed and the endothelial lining. The manifestation of all the cardinal signs of inflammation is found to be associated with damage of different components of the microcirculatory bed. Intensive peroxidation of lipids (oxidative stress) is observed in the inflammation focus. It is also shown that microcirculatory disorders in the inflammation focus are always synchronously accompanied by activation of blood plasma protein systems: coagulation, anticoagulation, kinin, and complementary. B.J.

A84-31519

**THE MECHANISM CONTROLLING THE EFFECT OF INFRASOUND ON ANIMALS AND HUMAN BEINGS (A REVIEW OF THE LITERATURE) [K VOPROSU O MEKHAZME DEISTVIA INFRAZVUKA NA ORGANIZM ZHIVOTNYKH I CHELOVEKA /OBZOR LITERATURY/]**

S. V. ALEKSEEV and N. A. MOZZHUKHINA (Leningradskii Sanitar'no-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) Gigiena Truda i Professional'nye Zabolovaniia, Sept. 1983, p. 35-37. In Russian. refs

A84-31522

**THE TOXICITY AND QUANTITY OF N-PENTANE IN THE TISSUES OF EXPERIMENTAL ANIMALS WHEN IT ACTS IN COMBINATION WITH HIGH TEMPERATURES [TOKSICHNOST' I KOLICHESTVO N-PENTANA V TKANIAX EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI EGO DEISTVII V SOCHETANII S POVYSHENNOI TEMPERATUROI]**

G. P. BABANOV, G. G. ABRAMIAN, G. N. ARTEMEVA, and V. K. SHAINA (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR) Gigiena Truda i Professional'nye Zabolovaniia, Sept. 1983, p. 53-55. In Russian. refs

A84-31601\* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**OBSERVATIONS ON THE CONNECTIVITY OF THE PARVICELLULAR RETICULAR FORMATION WITH RESPECT TO A VOMITING CENTER**W. R. MEHLER (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) Brain, Behavior and Evolution (ISSN 0006-8977), vol. 23, 1983, p. 63-80. refs  
(Contract NASA TASK 199-20-22-03)

The intrinsic and extrinsic connections of the parvicellular reticular formation (PCRF) that have been demonstrated by fiber degeneration studies and studied by more recently introduced horseradish peroxidase retrograde cell labeling are reviewed in an attempt to delimit the connectivity of the region in the PCRF where electrical stimulation produced emesis. Evidence is presented that certain specific functional subdivisions in PCRF such as the salivatory nuclei and the cells which give rise to the vestibular

efferent projections can be delimited. An attempt is made to differentiate the sources of brain stem afferent connections with the nucleus of the tractus solitarius, the vagal nucleus and the nucleus ambiguus complex. The literature bearing on the histochemistry of the brain stem is reviewed in a search for clues to possible unique histo- or immunochemical cytological subdivisions in the parvicellular reticular formation. Author

A84-31603\* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**INHIBITION OF CORTICAL AND TRABECULAR BONE FORMATION IN THE LONG BONES OF IMMOBILIZED MONKEYS**

T. J. WRONSKI and E. R. MOREY (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) Clinical Orthopaedics and Related Research (ISSN 0009-921X), vol. 181, Dec. 1983, p. 269-276. Research supported by the National Research Council. refs

Tetracycline derivatives are administered on three separate occasions to label the sites of bone formation. Determinations are made of the tetracycline-labeling frequency and mineral apposition rate of osteons and trabecular bone surfaces in the humerus and femur. The inhibition of bone formation induced by immobilization is found to be more pronounced in trabecular bone. The immobilized monkeys exhibit a moderate, but statistically nonsignificant, reduction in the percentage of osteons forming bone. Conversely, the dramatic decline in the percentage of trabecular surfaces undergoing bone formation in the monkeys is found to be highly significant. The diminished rate of mineral apposition in osteons is seen as suggesting that osteoblastic activity is impaired in cortical bone during immobilization. C.R.

A84-31607\* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**DISTRIBUTION OF SNOW AND ICE ALGAE IN WESTERN NORTH AMERICA**

R. A. WHARTON, JR. (NASA, Ames Research Center, Moffett Field, CA) and W. C. VINYARD (Humboldt State University, Arcata, CA) Madrono (ISSN 0024-9637), vol. 30, Nov. 10, 1983, p. 201-209. Research supported by Sigma Xi. refs

A84-31610\* Maryland Univ., Baltimore.

**NEURAL CONTROL OF MUSCLE**S. R. MAX and G. J. MARKELONIS (Maryland, University, Baltimore, MD) Neurochemistry International (ISSN 0197-0186), vol. 5, no. 6, 1983, p. 675-683. Research supported by the U.S. Veterans Administration. refs  
(Contract NIH-NS-15760; NIH-NS-15766; NIH-NS-16076; NAG2-100)

Cholinergic innervation regulates the physiological and biochemical properties of skeletal muscle. The mechanisms that appear to be involved in this regulation include soluble, neurally-derived polypeptides, transmitter-evoked muscle activity and the neurotransmitter, acetylcholine, itself. Despite extensive research, the interacting neural mechanisms that control such macromolecules as acetylcholinesterase, the acetylcholine receptor and glucose 6-phosphate dehydrogenase remain unclear. It may be that more simplified in vitro model systems coupled with recent dramatic advances in the molecular biology of neurally-regulated proteins will begin to allow researchers to unravel the mechanisms controlling the expression and maintenance of these macromolecules. Author

A84-31612\* Brown Univ., Providence, R. I.

**THE DISPOSITION OF DNA IN PROCHLORON (PROCHLOROPHYTA)**A. W. COLEMAN (Brown University, Providence, RI) and R. A. LEWIN (California, University, La Jolla, CA) Phycologia (ISSN 0031-8884), vol. 22, no. 2, 1983, p. 209-212. refs  
(Contract NSF PCM-79-23054; NSF DEB-76-82919; NAGW-181)

The discovery of both chlorophyll a and b in the prokaryote Prochloron Lewin, a trait otherwise unique to eukaryotic photosynthetic organisms, has stimulated speculation on the

possible endosymbiont origins of the plastids of eukaryotic cells. The arrangement of DNA in *Prochloron* was therefore dyed in situ with the fluorochrome dye DAPI and compared with the plastid DNA of various eukaryote cells. The DNA of *Prochloron* is found to be clearly different in arrangement and locale from that of blue-green algae. In the great size of its nucleoids and their apparently high DNA content, *Prochloron* also differs from the plastids of any eukaryotes, with the possible exception of dinoflagellates. *Prochloron* remains an evolutionary puzzle. C.D.

**A84-31613\*** California Univ., Santa Barbara.

**MAJOR DETERMINANTS OF THE BIOGEOGRAPHIC PATTERN OF THE SHALLOW-SEA FAUNA**

J. W. VALENTINE (California, University, Santa Barbara, CA) and D. JABLONSKI (Arizona, University, Tucson, AZ) *Societe Geologique de France, Bulletin* (ISSN 0037-9409), vol. 24, no. 5-6, 1982, p. 893-899. refs  
(Contract NSF EAR-78-15536; NAG2-73)

The benthic shallow-sea is defined as the region of sea floor lying between the supralittoral zone at the shoreline and the impingement of the thermocline separating a warm shallow and variable portion of the water column from rather homogeneous and constant cooler waters beneath. Three types of shallow-sea provinces can be recognized: (1) one-dimensional, linear shelves; (2) two-dimensional shelves; and (3) scattered islands in two-dimensional arrays. Dispersal powers of marine invertebrates vary with developmental mode, and patterns of dispersal, endemism and speciation vary among the different provincial types. Invertebrate developmental modes vary systematically with geography, and presumably are adaptive to environmental conditions. Clades with only a single mode of development tend to be restricted to regions appropriate to that mode, significantly affecting their biogeographic patterns. The consequences of geographic and other environmental changes are reviewed.

Author

**A84-31801\*** California Univ., La Jolla.

**THE PROBLEMS OF PROCHLORON**

R. A. LEWIN (California, University, La Jolla, CA) *Annales de Microbiologie* (ISSN 0300-5410), vol. 134B, 1983, p. 37-41. refs  
(Contract NAGW-181)

Prokaryotic green algae (prochlorophytes), which contain chlorophylls a and b but no bilin pigments, may be phylogenetically related to ancestral chloroplasts if symbiogenesis occurred. They may be otherwise related to eukaryotic chlorophytes. They could have evolved from cyanophytes by loss of phycobilin and gain of chlorophyll b synthesis. These possibilities are briefly discussed. Relevant evidence from biochemical studies in many collaborative laboratories is now becoming available for the resolution of such questions.

Author

**A84-32367**

**THE ACTIVITY OF OXIDATIVE ENZYMES OF THE CYCLE OF TRICARBOXYLIC ACIDS IN THE RAT MYOCARDIUM DURING HYPOKINESIA [AKTIVNOST' OKISLITEL'NYKH FERMENTOV TSIKLA TRIKARBONOVYKH KISLOT V MIOKARDE KRYA PRI GIPOKINEZII]**

IU. A. GANIN (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR) *Kardiologiia* (ISSN 0022-9040), vol. 23, Sept. 1983, p. 87-90. In Russian. refs

It is shown that limited motor activity resulted in a drop of mitochondrial tricarboxylic dehydrogenase activity in rats. The early days of hypokinesia are characterized by a reduction of the specific activity of the dehydrogenases; on days 45 and 60 the changes are due to smaller levels of the mitochondrial fraction protein. The activity of cytoplasmic NADP-MDH and NAD-MDH undergoes changes by day 60 of immobilization, and that of NADP-ICDH by day 7 only. Hypokinesia disrupts the ratio between mitochondrial and cytoplasmic dehydrogenases, and it is shown that a 25-day-long recovery period is not sufficient for the normalization of oxidative processes in the cycle of tricarboxylic acids. B.J.

**A84-32369**

**SPACE BIOLOGY AND MEDICINE - YESTERDAY AND TODAY [KOSMICHESKAI BIOLOGIIA I MEDITSINA - VEHERA I SEGODNIA]**

O. G. GAZENKO *Zemlia i Vselennaia* (ISSN 0044-3948), Sept.-Oct. 1983, p. 4-8. In Russian.

The progress of Soviet space biology and medicine is traced from the respective space flights of Laika, the space dog, in 1957, and Yuri Gagarin, the cosmonaut, aboard the Vostok in 1961 to the Kosmos series of biosatellites launched between 1973 and 1983. It is noted that centrifuge experiments aboard the Kosmos-936 demonstrated that the simulation of gravity in weightlessness prevents the development of many negative effects associated with weightless conditions. Important findings regarding the response of the human organism to extended space missions have resulted from the Salyut-7 missions. Data on the functioning of the cardiovascular system and on red blood cell count are cited. J.N.

**A84-32372**

**THE EFFECT OF DIFFERENT PROTEIN CONTENTS IN THE DIET ON THE STRUCTURE OF BLOOD VESSELS [VLIANIE RAZLICHNOGO SODERZHANIIA BELKA V RATSIONE NA STRUKTURU KROVENOSNYKH SOSUDOV]**

A. L. POZDNIakov, M. M. LEVACHEV, L. G. PONOMAREVA, K. A. LARICHEVA, and M. KIM (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Pitaniia* (ISSN 0042-8833), Sept.-Oct. 1983, p. 23-28. In Russian. refs

Experiments on rats show that the prolonged use (1-6 months) of a diet with protein deficiency or excess (5 and 30 percent, respectively, with regard to caloricity) determines the development of injuries to the aortal wall and arteries of the heart and kidneys. Vascular elasticity shows an abnormality which is most pronounced if the animals are given the low-protein diet including butter. Sunflower oil is found to have a protective effect, which becomes manifest if the animals receive the high-protein diet. B.J.

**A84-32373**

**MOLECULAR ASPECTS OF THE MECHANISM CONTROLLING THE ACTION OF INSULIN [MOLEKULIARNYE ASPEKTY MEKHANIZMA DEISTVIIA INSULINA]**

I. N. KENDYSH (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) *Uspekhi Sovremennoi Biologii* (ISSN 0042-1324), vol. 96, Sept.-Oct. 1983, p. 238-254. In Russian. refs

Consideration is given to the importance of the interaction between insulin and the receptors, the phosphorylation of membranous proteins, and the oxidation of the sulfhydryl groups of cytoplasmic membranes in paving the way for the hormone's transport function. The hypothetical role played by intermediaries in the mechanism by which insulin regulates intracellular metabolic processes is analyzed. On the basis of the present state of knowledge, it is not thought possible to determine the primary functional structure of the cytoplasmic membrane or the type and sequence of biochemical reactions in the mechanism by which insulin acts. C.R.

**A84-32374**

**TRIGGER MODEL FOR MUSCULAR CONTRACTION [TRIGGERNAIA MODEL' MYSHECHNOGO SOKRASHCHENIIA]**

V. P. NOVIKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Uspekhi Sovremennoi Biologii* (ISSN 0042-1324), vol. 96, Sept.-Oct. 1983, p. 255-268. In Russian. refs

The contradiction between traditional views on the mechanism of muscular contraction and experimental results served as the motivation in developing a model which takes into account the conformational changes in the subfragment-2 region of the myosin molecule and the cooperativity of its two heads. A study of the molecular foundations of the structure and function of striated muscles, on which the model is based, also suggests the existence of a constant adenine nucleotide complex. A discussion of the mechanism of phosphorylation of the S-2 ADP complex is presented. According to the model, the myosin molecule is



represented as a trigger system in which two opposing states, the two myosin heads, are reversed under the action of an external signal, the phosphorylation (dephosphorylation) of the S-2 ADP complex. Experimental data supporting the present model are discussed. J.N.

## A84-32375

**THE PYROANTIMONATE METHOD AND THE INTRACELLULAR LOCALIZATION OF CALCIUM IN MUSCLES [PIROANTIMONATNYI METOD I VNUTRIKLETOCHNAIA LOKALIZATSIYA KAL'TSIYA V MYSHTSAKH]**

N. V. SAMOSUDOVA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) *Uspekhi Sovremennoi Biologii* (ISSN 0042-1324), vol. 96, Sept.-Oct. 1983, p. 269-279. In Russian. refs

An analysis is made of the characteristics of the pyroantimonate method, which is used for the identification of calcium in muscles of different functions. Attention is given to the main differences in the calcium distribution in the smooth and striated muscles of vertebrates and invertebrates. An investigation is also made of the factors determining the visualization of the reaction of potassium pyroantimonate with calcium-binding centers of subcellular structures in the muscle fiber. B.J.

## A84-32381

**THE EFFECT OF SPECIFIC INHIBITORS OF RESPIRATORY CHAIN ENZYMES AND ATP SYNTHETASE ON THE ION TRANSPORT IN MITOCHONDRIA INDUCED BY NONENZYMATIC PEROXIDE REACTIONS [VLIANIE SPETSIFICHESKIKH INGIBITOROV FERMENTOV DYKHATEL'NOI TSEPI I ATF-SINTETAZY NA TRANSPORT IONOV V MITOKHONDRIAKH, INDUTSIROVANNYI NEFERMENTATIVNYMI PEREKISNYMI REAKTSIIAMI]**

V. N. MARSHANSKII, S. A. NOVGORODOV, and L. S. IAGUZHINSKII (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, Sept.-Oct. 1983, p. 830-834. In Russian. refs

## A84-32382

**THE EFFECT OF MECHANICAL CONDITIONS ON MYOCARDIAL CHRONOTROPY [VLIANIE MEKHANICHESKIKH USLOVII NA KHRONOINOTROPII MIKARDA]**

V. IA. IZAKOV and S. V. ZHELAMSKII (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profesional'nykh Zaboolevani, Sverdlovsk, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, Sept.-Oct. 1983, p. 853-857. In Russian. refs

The force-frequency relationships in isometric, isotonic, and auxotonic contraction regimes in rabbit right papillary muscles are analyzed using an uncorrelated Gaussian input sequence of interstimulus intervals. The mechanical regimes studied are shown to differ in terms of: (1) coefficients of amplitude variations of the mechanical activity (given the same input dispersion); (2) the dependence of mechanical activity on the amplitude of the preceding contraction; and (3) the force-frequency relationships calculated from the regression equations. The reasons for these differences are discussed, and the use of chronotropic indices as contractility measures is considered. B.J.

## A84-32383

**THE EFFECT OF VANADATE ON THE  $Ca^{2+}$  ACTIVATION OF SKELETAL MUSCLE [VLIANIE VANADATA NA  $Ca^{2+}$ -AKTIVATSIU SKELETNOI MYSHTSY]**

B. IA. SONKIN and A. E. BUKATINA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, Sept.-Oct. 1983, p. 886, 887. In Russian. refs

Vanadate (0.1 mM) is shown to reduce the tension of glycerinated rabbit psoas muscle fibers. It also shifts the tension-pCa curve to lower pCa, increases the rate constant of delayed tension development, and alters the dependence of this rate constant on the level of  $Ca^{2+}$  activation. The vanadate stops the increase of the rate constant with increasing  $Ca^{2+}$ -activated tension. Since the actin-myosin-ADP complex is

dissociated by vanadate, the muscle performance at low activation levels is assumed to be conditioned mainly by the cross-bridges interacting with actin of actin blocks switched on by myosin-ADP. B.J.

## A84-32384

**ROLE OF SYNCHRONIZATION IN THE INFLUENCE OF WEAK ELECTROMAGNETIC SIGNALS OF THE MILLIMETER WAVE RANGE ON LIVING ORGANISMS [ROL' SINKHRONIZATSII V VOZDEISTVII SLABYKH ELEKTROMAGNITNYKH SIGNALOV MILLIMETROVOGO DIAPAZONA VOLN NA ZHIVYE ORGANIZMY]**

N. D. DEVIATKOV, M. B. GOLANT, and A. S. TAGER *Biofizika* (ISSN 0006-3029), vol. 28, Sept.-Oct. 1983, p. 895, 896. In Russian. refs

A mechanism is suggested for the effect of weak electromagnetic radiation on living organisms, and is based on the assumption that the electromechanical self-oscillations of cellular substructures such as membrane sites correspond to the natural state of living cells. The structure of the membrane sites is modeled as a collection of a large number of weakly interconnected oscillators. It is established that the synchronization of these self-oscillations by an external electromagnetic field leads to the appearance of internal information signals which effect the regulatory systems of organisms. J.N.

## A84-32387

**EXPERIMENTAL STUDIES OF THE RESPONSE REACTIONS OF THE BODY TO A CONSTANT MAGNETIC FIELD (ON THE BASIS OF THE PARAMETERS OF ULTRASTRUCTURAL CHANGES IN CENTRAL NEURONS AND SOME NEUROIMMUNE PHENOMENA) [EKSPERIMENTAL'NYE ISSLEDOVANIYA OTVETNYKH REAKTSII ORGANIZMA NA VOZDEISTVIA POSTOIANNOGO MAGNITNOGO POLIA /PO POKAZATELIAM UL'TRASTRUKTURNYKH IZMENENII NEIRONOV TSENTRAL'NOI NERVENNOI SISTEMY I NEKOTORYKH NEIROIMMUNNYKH IAVLENI/]**

V. A. MATIUSHKIN, A. P. SPERANSKII, E. S. SVIATENKO, and V. V. POLTORANOV (Nauchno-Issledovatel'skii Institut Skoro Pomoshchi, Moscow, USSR) *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Sept.-Oct. 1983, p. 12-16. In Russian. refs

## A84-32388

**FEATURES OF HYPOTHALAMIC NEUROSECRETION UNDER THE EFFECT OF CONSTANT MAGNETIC FIELDS [OSOBENNOSTI GIPOTALAMICHESKOEI NEUROSEKRETSII PRI DEISTVII POSTOIANNYKH MAGNITNYKH POLEI]**

S. A. VASHURINA (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Sept.-Oct. 1983, p. 16-18. In Russian.

Histochemical and morphometric techniques demonstrated that constant magnetic fields (CMFs) of 1, 2.5, 5, and 10 mT have a stimulating effect on hypothalamic neurosecretion. The degree of neurosecretion reinforcement does not necessarily depend on the CMF strength. The procedures used do not produce a further increase in the neurosecretory activity; the latter was observed 10-15 days after the discontinuation of the CMF effect. It is noted that the CMF effect may be used in the treatment of diseases of different etiology and pathogenesis. B.J.

## A84-32390

**THE EFFECT OF DECIMETER WAVES ON THE ACTIVITY OF AN INFLAMMATORY PROCESS IN EXPERIMENTAL POLYARTHRITIS [VLIANIE DETSIMETROVYKH VOLN NA AKTIVNOST' VOSPALITEL'NOGO PROTSESSA PRI EKSPERIMENTAL'NOM POLIARTRITE]**

V. D. SIDOROV, V. I. POPOV, and I. M. KHOVAKH (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) *Voprosy Kurortologii Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Sept.-Oct. 1983, p. 28-31. In Russian. refs



A84-32464

**SYSTEM ANALYSIS OF REGULATION MECHANISMS FOR THE OXYGEN AFFINITY OF BLOOD. II - FEATURES OF THE REGULATION OF OXYGEN-BINDING PROPERTIES OF BLOOD IN CIRCULATION [SISTEMNYI ANALIZ MEKHANIZMOV REGULIATSII SRODSTVA KROVI K KISLORODU. II - OSOBNOSTI REGULIATSII KISLORODOSVIAZUIUSHCHIKKH SVOISTV KROVI V PROTSESSE EE TSIRKULIATSII]**

M. V. BORISIUK (Grodzenskii Meditsinskii Institut, Grodno, Belorussian SSR) *Uspekhi Fiziologicheskikh Nauk* (ISSN 0301-1798), vol. 15, Apr.-May-June 1984, p. 3-26. In Russian. refs

Principal regulations for the formation of oxygen-binding characteristics of blood are analyzed with respect to the conditions of circulation in separate organs. The mechanism for the change of oxygen-binding properties with different endocrine backgrounds is studied. Mechanisms of the 'mutual assistance' between separate structural components of the oxygen transport system are investigated, and the oxygen regime and functional state of the cardiovascular system at elevated and depressed oxygen affinity of blood are analyzed. A factor for the regulation of the functional properties of red blood cells is identified in 3,5 AMP, which, upon entering the bloodstream in the activation of the adenylate cyclase system in the target organs, is able to increase the oxygen affinity of blood. J.N.

A84-32465

**PARTICIPATION OF CHALONES IN ERYTHROPOIESIS REGULATION [OB UCHASTII KEILONOV V REGULIATSII ERITROPOEZA]**

G. V. NEUSTROEV (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) *Uspekhi Fiziologicheskikh Nauk* (ISSN 0301-1798), vol. 15, Apr.-May-June 1984, p. 27-40. In Russian. refs

Experimental results indicating the important role of chalone in the regulation of erythropoiesis are reviewed. The techniques included immunology, spectrofluorometry, electrophoresis, luminescence, the method of exogenic colonies, cell cultures, gel filtration, and affine chromatography. The obtained results may be extended to other types of tissue-specific inhibitors besides erythrocytic. On the cellular level, chalone act mainly on a class of proliferating cells (proerythroblasts, erythroblasts) and have no real influence on trunical and differentiated cells. On the molecular level, chalone act on erythroid cells through surface receptors. The hypothesis according to which chalone are considered surface membrane proteins of a cell was verified in experiments with hepatic chalone. The liberation of chalone from cells is determined to be a Ca-dependent enzymatic process, controlled by mediators of the sympatho-adrenal system. J.N.

A84-32466

**STRUCTURAL AND FUNCTIONAL ORGANIZATION OF THE MEDIAL FASCICLE OF THE FOREBRAIN [STRUKTURNO-FUNKTSIONAL'NAIA ORGANIZATSIIA MEDIAL'NOGO PUEHKA PEREDNEGO MOZGA]**

A. IA. MOGILEVSKII (Ministerstvo Zaravookhraneniia Ukrainkoi SSR, Institut Nevrologii i Psikhatrii, Kharkov, Ukrainian SSR) and D. A. ROMANOV (Akademiia Nauk Ukrainkoi SSR, Fiziko-Tekhnicheskii Institut Nizkikh Temperatur, Kharkov, Ukrainian SSR) *Uspekhi Fiziologicheskikh Nauk* (ISSN 0301-1798), vol. 15, Apr.-May-June 1984, p. 41-62. In Russian. refs

Results of investigations of the morphology and neurochemistry of afferent and efferent connections of the medial fascicle of the forebrain (MFFB) and its role in a series of cerebral functions are discussed. The participation of the MFFB in the regulation of sleep and wakefulness with their electrophysical correlatives, emotional and motivational mechanisms, and memory, is also considered. Despite its multifunctionality, the MFFB is not an 'equipotential structure'. On every level MFFB orders differentiated sets of connections of structural elements included in functional systems, largely determining the possibility of their unification. J.N.

A84-32468

**CARBON AND HYDROGEN ISOTOPIC COMPOSITIONS OF ALGAE AND BACTERIA FROM HYDROTHERMAL ENVIRONMENTS, YELLOWSTONE NATIONAL PARK**

M. L. F. ESTEP (Carnegie Institution of Washington, Washington, DC) *Geochimica et Cosmochimica Acta* (ISSN 0016-7037), vol. 48, March 1984, p. 591-599. Research supported by the Charles E. Culpeper Foundation and Atlantic Richfield Foundation. refs

The carbon and hydrogen isotopic compositions of a suite of algae and bacteria from various recent and hydrothermal environments have been analyzed to determine whether these life forms are analogous to ancient ones. Variations in the isotopic compositions were affected by dissolved inorganic carbon concentration, temperature, species composition, and pH. Those samples having the most negative carbon isotopic compositions were from blue-green algae that grew in environments with high inorganic carbon levels, elevated temperatures, and neutral pH. The carbon isotopic compositions of many of the algae and bacteria are in the range of  $\delta$ -13 values of Precambrian carbon. C.D.

A84-32503

**LIFE SCIENCE RESEARCH ON-BOARD SPACELAB. III - THE SPACELAB-1 MISSION**

M. J. F. FOWLER (Royal Free Hospital, London, England) *British Interplanetary Society, Journal (Space Chronicle)* (ISSN 0007-084X), vol. 37, May 1984, p. 213-218. refs

Attention is given to the 15 Life Sciences experiments of the Spacelab 1 mission, which encompassed radiobiology and space environment studies, hematology and immunology studies, human physiology studies, and botany experiments. Several of the human physiology vestibular experiments are a prelude to future ones employing the Space Sled facility of the Spacelab D-1 mission, which is scheduled for June, 1985. The radiobiological experiments tested the interaction of cosmic radiation with biological specimens. The hematology and immunology studies gave attention to the influence of microgravity on the cellular composition of human blood and the body's immune response. The botany studies investigated the space environment's influence on plant growth. O.C.

A84-32564

**EFFECT OF ARGININE VASOPRESSIN, ACETAZOLAMIDE, AND ANGIOTENSIN II ON CSF PRESSURE AT SIMULATED ALTITUDE**

L. C. SENAY, JR. and D. L. TOLBERT (St. Louis University, St. Louis, MO) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, May 1984, p. 370-376. refs (Contract DAMD17-81-C-1044)

The following conditions were studied in rabbits and arginine vasopressin (AVP)-deficient Brattleboro rats: (1) the influence of simulated altitude on cerebral spinal fluid (CSF) pressure and brain water content, (2) the influence of hypoxia on CSF AVP concentration, (3) the effects on CSF pressures of AVP administered into the systemic circulation and the lateral ventricles, and (4) the effects on CSF pressures of agents such as angiotensin II, All blocker, acetazolamide, prostaglandins E(2) and F(1 alpha), and norepinephrine. It is suggested that exposure of humans to altitude generally produces fluid shifts and body water loss, which may stimulate central production of angiotensin II and consequently increase CSF pressures. Such a response could be involved in hypoxia and acute mountain sickness. It is also noted that All may be significant in relation to CSF dynamics. C.M.

A84-32565

**BILIRUBIN METABOLISM IN THE RAT AT HIGH ALTITUDE**

M. A. NEWBERRY, L. G. MOORE, and L. S. CRNIC (Colorado, University, Denver, CO) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, May 1984, p. 377-380. Research supported by the American Heart Association and Colorado Heart Association. refs (Contract NIH-HD-08315)

Rats exposed to a simulated 4,600 m altitude for two and six weeks unconjugated bilirubin (0, 0.5, 1.5, 3.0, or 4.5 mg/100g) to

determine whether deficits in conjugation of bilirubin could account for high altitude hyperbilirubinemia. Rats to which exogenous bilirubin was not administered exhibited polycythemia at high altitude as well as increased serum bilirubin levels. In comparison to sea-level controls, rats at high altitude and given bilirubin had greater mean serum concentrations of total and unconjugated bilirubin; mean serum conjugated bilirubin levels did not increase at any dose. It was concluded that bilirubin uptake and/or conjugation were impaired in rats exposed to high altitude, though polycythemia could have contributed to high altitude-induced bilirubinemia. C.M.

**A84-32566\*** Texas Univ., Dallas.

**THE INFLUENCE OF RAT SUSPENSION-HYPOKINESIA ON THE GASTROCNEMIUS MUSCLE**

G. H. TEMPLETON, M. PADALINO, J. MANTON, T. LECONEY, H. HAGLER, and M. GLASBERG (Texas, University, Dallas, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 381-386. refs (Contract NAGW-140)

Hind-limb hypokinesia was induced in rats by the Morey method to characterize the response of the gastrocnemius muscle. A comparison of rats suspended for 2 weeks with weight, sex, and litter-matched control rats indicate no difference in gastrocnemius wet weight, contraction, or one-half relaxation times, but less contractile function as indicated by lowered dP/dt. Myosin ATPase staining identified uniform Type I (slow-twitch) and II (fast-twitch) atrophy in the muscles from 4 of 10 rats suspended for 2 weeks and 1 of 12 rats suspended for 4 weeks; muscles from three other rats of the 4-week group displayed greater Type I atrophy. Other histochemical changes were characteristic of a neuropathy. These data together with recently acquired soleus data (29) indicate the Morey model, like space flight, evokes greater changes in the Type I or slow twitch fibers of the gastrocnemius and soleus muscles. Author

**A84-32591**

**STRESS HORMONES - THEIR INTERACTION AND REGULATION**

J. AXELROD and T. D. REISINE (National Institutes of Health, National Institute of Mental Health, Bethesda, MD) Science (ISSN 0036-8075), vol. 224, May 4, 1984, p. 452-459. refs

Stress stimulates several adaptive hormonal responses. Prominent among these responses are the secretion of catecholamines from the adrenal medulla, corticosteroids from the adrenal cortex, and adrenocorticotropin from the anterior pituitary. A number of complex interactions are involved in the regulation of these hormones. Glucocorticoids regulate catecholamine biosynthesis in the adrenal medulla and catecholamines stimulate adrenocorticotropin release from the anterior pituitary. In addition, other hormones, including corticotropin-releasing factor, vasoactive intestinal peptide, and arginine vasopressin stimulate while the corticosteroids and somatostatin inhibit adrenocorticotropin secretion. Together these agents appear to determine the complex physiologic responses to a variety of stressors. Author

**A84-33051**

**THE EFFECT OF A CRANIOCEREBRAL WOUND ON THE DEVELOPMENT OF EDEMA IN THE BRAIN AFTER RESUSCITATION [VLIANIE CHEREPNO-MOZGOVOI TRAVMY NA RAZVITIE POSTREANIMATSIONNOGO OTEKA MOZGA]**

K. KH. ALMAGAMBETOV and V. G. KORPACHEV (Tselinogradskii Meditsinskii Institut, Tselinograd, Kazakh SSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 15-18. In Russian. refs

Disturbances in the electrolyte-water balance in the brain in animals (rabbits) after a state of apparent death is induced are investigated. The apparent death is caused by either a rapid or a slow loss of blood, and the rabbits have a closed craniocerebral wound. When the loss of blood is rapid, edema develops in the cerebral cortex after resuscitation; it is especially pronounced when the period of bloodletting is increased. According to data obtained from impedance measurements, the two earliest electrolyte-water

disorders in the period after resuscitation are (1) a decrease in the amount of extracellular space and (2) hyperhydration of the cells owing to an excessive accumulation of sodium and acid products in the cells. The hyperhydration can be reversible but it can also increase in the period after hypoxia. The severity of the neurological disorders depends on which of these occurs. C.R.

**A84-33052**

**THE EFFECT OF CHRONIC HEMOLYTIC ANEMIA ON THE HEART CONTRACTILE FUNCTION AND THE INCREASE IN ITS RESISTANCE TO HYPOXIA [VLIANIE KHRONICHESKOI GEMOLITICHESKOI ANEMII NA SOKRATITEL'NUIU FUNKTSIU SERDTSIA I POVYSHENIE EGO REZISTENTNOSTI K GIPOKSII]**

F. Z. MEERSON, M. E. EVSEVEVA, and E. E. USTINOVA (Akademiya Meditsinskikh Nauk SSSR, Moscow; Stavropol'skii Meditsinskii Institut, Stavropol, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 25-29. In Russian. refs

**A84-33053**

**CENTRAL HEMODYNAMICS AND THE CONTRACTILE OPERATION OF THE MYOCARDIUM IN THE CASE OF EXPERIMENTAL MITRAL VALVE INSUFFICIENCY [TSENTRAL'NAIA GEMODINAMIKA I SOKRATITEL'NAIA FUNKTSIIA MIOKARDA PRI EKSPERIMENTAL'NOI NEDOSTATOCHNOSTI MITRAL'NOGO KLAPANA]**

T. I. PIMENOVA (Tsentral'nyi Institut Usovershenstvovaniya Vrachey, Moscow, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 29-33. In Russian. refs

**A84-33054**

**EXTERNAL RESPIRATION AFTER EXTENSIVE LUNG RESECTION UNDER CONDITIONS OF REGENERATION STIMULATION [FUNKTSIIA VNESHNEGO DYKHANIYA POSLE OBSHIRNOI REZEKTSII LEGKIKH V USLOVIYAKH REGENERATSII]**

G. L. BILICH and A. O. PUZIKOV (Mariiskii Universitet, Yoshkar-Ola, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 46-50. In Russian. refs

**A84-33055**

**STRUCTURAL CHANGES IN THE TISSUE COMPONENTS OF NEPHRONS AFTER THERMAL STRESS AT VARIOUS PERIODS IN POSTNATAL DEVELOPMENT [STRUKTURNYE IZMENENIYA TKANEVYKH KOMPONENTOV NEFRONOV POSLE TEPOVOGO STRESSA V RAZLICHNYE PERIODY POSTNATAL'NOGO RAZVITIYA]**

O. Z. MKRTCHAN (Tiumenskii Gosudarstvennyi Universitet; Tiumenskii Meditsinskii Institut, Tyumen, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 50-53. In Russian. refs

**A84-33056**

**THE EFFECT OF A HYPOPHYSECTOMY ON THE REACTION OF BONE MARROW EOSINOPHILS AFTER THE INTRODUCTION OF PREPARATIONS ACTING MAINLY IN THE REGION OF PERIPHERAL M-CHOLINERGIC RECEPTORS [VLIANIE GIPOFIZEKTOMII NA REAKTSIU EOZINOFILOV KOSTNOGO MOZGA POSLE VVEDENIYA PREPARATOV, DEISTVUIUSHCHIKH PREIMUSHCHESTVENNO V OBLASTI PERIFERICHESKIKH M-KHOLINORETSEPTOROV]**

IU. B. DESHEVOI Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1983, p. 54-56. In Russian. refs

A84-33057

**THE PLUS-MINUS INTERACTION PRINCIPLE IN THE REGULATION OF THE IMMUNE RESPONSE DURING THE TOXIC AFFECTATION OF THE LIVER [PRINTSIP 'PLUS-MINUS VZAIMODEISTVIA' V REGULIATSII IMMUNNOGO OTVETA PRI TOKSICHESKOM PORAZHENii PECHENI]**

L. G. PROKOPENKO, A. I. KONOPLIA, and N. N. KEDROVSKAIA (Kurskii Meditsinskii Institut, Kursk, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1983, p. 59-63. In Russian. refs

The protection of the immunostimulating factor (ISF) by the splenocytes of animals poisoned by hepatotropic poison was studied, and an attempt was made to identify the role of the red blood cells in the induction of this process. The supernatant of the splenocytes of intact rats does not affect the immune response induced by sheep red cells in syngeneic animals. It is shown that the splenocytes of rats poisoned with carbon tetrachloride excrete ISF into the culture medium, and that the splenocytes of healthy rats given injections of the red cells of poisoned rats produce ISF. Factors produced by rat splenocytes were found to inhibit the appearance of red cells stimulating ISF production by the splenic cells in the blood of poisoned animals. B.J.

A84-33058

**AN EVALUATION OF THE INTERACTIONS BETWEEN PARAMETERS DESCRIBING AN ORGANISM'S INTERNAL MEDIUM DURING THE DEVELOPMENT OF AN ADAPTATIONAL 'ACTIVATION REACTION' [OTSENKA VZAIMODEISTVIA PARAMETROV VNUTRENNEI SREDY ORGANIZMA PRI RAZVITII ADAPTATSIONNOI 'REAKTSII AKTIVATSII']**

IU. N. BORDIUSHKOV and L. I. MALIUTINA (Ministerstvo Zdravookhraneniia RSFSR, Rostovskii Nauchno-Issledovatel'skii Onkologicheskii Institut, Rostov-on-Don, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1983, p. 69-73. In Russian. refs

A84-33059

**SENSITIVITY OF MUSCLE TISSUE AND LYMPHOCYTES TO INSULIN AFTER A BURN TRAUMA [CHUVSTVITEL'NOST' MYSHECHNOI TKANI I LIMFOTSITOV K INSULINU POSLE OZHGOVOI TRAVMY]**

S. A. MORENKOVA, E. G. DAVLETOV, and A. A. KARELIN (Akademiia Meditsinskikh Nauk SSSR, Moscow; Bashkirskii Meditsinskii Institut, Ufa, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1983, p. 81-83. In Russian. refs

Glucose utilization by the soleus muscle and lymphocytes after a burn trauma was studied experimentally in rats. In contrast to the controls, there was no glucose-utilization-stimulating effect of insulin in the muscles 24 hours after the burn. Both the basal and insulin-stimulated glucose utilization in the lymphocytes is reduced sharply. By the third day after the burn the basal and insulin-stimulated glucose utilization by the muscle remains diminished while it is restored to normal levels in the lymphocytes. It is concluded that a burn trauma leads to the diminished sensitivity of cells to insulin in the early stages. B.J.

A84-33060

**THE SPLEEN AND THE ORGANISM'S PROTECTIVE FUNCTIONS [SELEZENKA I ZASHCHITNAIA FUNKTSIIA ORGANIZMA]**

S. IU. SAFAROV, G. K. TIUNINA, and M. E. GADZHIEV (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Transplantologii i Iskusstvennykh Organov, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1983, p. 86-91. In Russian. refs

A survey of the literature reveals that the spleen has been shown to be an organ that works to protect the organism from infection. In filtering the blood, a splenic transplant hinders, immobilizes, and phagocytoses microbes, toxins, and foreign bodies; it also produces immunoglobulins and tetrapeptides, such as opsonin, which stimulate cellular phagocytosis. Transplanted splenic tissue performs these functions 10 to 20 times more

effectively than an unimpaired liver. Attention is also given to the prospect of using spleen transplantation in treating infectious complications. C.R.

A84-33154

**MECHANISMS OF ADAPTIVE REORGANIZATION OF ERYTHROCYTE ENERGY METABOLISM IN ACUTE HEMORRHAGE [MEKHANIZMY ADAPTIVNOI PERESTROIKI ENERGETICHESKOGO OBMENA ERITROTSITOV PRI OSTROI KROVOPOTERE]**

Z. I. MIKASHINOVICH (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 12-15. In Russian. refs

A84-33155

**CHARACTERISTICS OF INTRAVASCULAR BLOOD COAGULATION SYNDROME IN BURN DISEASE [KHARAKTERISTIKA SINDROMA VNUTRISOSUDISTOGO SVERTYVANIIA KROVI PRI OZHGOVOI BOLEZNI]**

V. P. BALUDA, V. M. ZIABLITSKII, T. I. LUKOIANOVA, R. L. MASLENNIKOVA, V. A. TSYGANKOVA, L. V. KOZELSKAIA, V. N. ROMANOVSKAIA, and A. N. STAROSEL'SKAIA (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 19-23. In Russian. refs

A84-33156

**MYOCARDIUM METABOLISM IN THE EARLY PERIODS FOLLOWING SOFT-TISSUE INJURY [K METABOLIZMU MIOKARDA V RANNIE PERIODY POSLE TRAVMY MIAGKIKH TKANEI]**

L. T. LYSYI and A. A. ZORKIN (Kishinevskii Meditsinskii Institut, Kishinev, Moldavian SSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 23-27. In Russian. refs

Data for this investigation were obtained from the traumatized soft tissues of the hind limbs of rats 10, 30, 60 minutes, and 4 hours after the application of special clamps, and also 1.5 hours after the removal of the clamps. The myocardium of intact animals, which served as the control tissue, exhibited characteristically higher activity of ICDH than MDH, but the activity of the NAD-dependent enzymes was higher than that of the NADP forms. The correlative relations between enzymes and their different isoenzymes are suggested to be of the greatest significance for myocardial activity. A sharp increase in the number of relations, as well as the appearance of closer relations, were observed directly after trauma. Changes in the investigated oxidoreductases in the content of the nucleotide pool directly reflect the degree of the effect of mediators on the sympathetico-adrenal and hypothalamo-hypophyseal-adrenal systems on the myocardium metabolism. J.N.

A84-33157

**MORPHOLOGICAL AND FUNCTIONAL CHARACTERISTICS OF ADRENERGIC INNERVATION OF MICROVESSELS AND TERMINAL BLOOD FLOW IN STRESS [MORFOFUNKSIONAL'NAIA KHARAKTERISTIKA ADRENERGICHESKOI INNERVATSII MIKROSOSUDOV I TERMINAL'NOGO KROVOTOKA PRI STRESSE]**

E. B. KHAISMAN, M. P. GORIZONTOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and A. M. CHERNUKH (Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 30-36. In Russian. refs

Male rats were subjected to either a single one-hour immobilization or repeated one-hour immobilization per day over a period of five days. A comparison of mesentery preparations from control and experimental rats shows that the single one-hour immobilization causes a sharp decrease in the luminescence of the adrenergic perivascular plexus over the entire microcirculatory bed of the mesentery. Also observed were a diminished blood flow in the venules, the presence of a granular flow, the formation of erythrocyte aggregates in the capillary and post-capillary venules,

and the appearance of plasmatic vessels. Another effect was an increase in the release of biogenic amines from mast cells through diffusion. Repeated immobilization, however, leads to an activation of adaptation mechanisms on the level of the microcirculatory system. The leading role of the adrenergic innervation structures in the development of stress adaptation at this level is confirmed.

J.N.

A84-33158

**ROLE OF THE PROSTAGLANDIN SYSTEM IN THE PATHOGENESIS OF SPONTANEOUS HYPERTENSION IN RATS [O ROLI PROSTAGLANDINOVOI SISTEMY V PATOGENEZE SPONTANNOI GIPERTONII U KRYs]**

KH. M. MARKOV, G. F. ZADKOVA, and I. A. IVANOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 36-40. In Russian. refs

A84-33159

**VASOACTIVE PEPTIDES AND THE FORMATION OF HEREDITARY HYPERTENSION IN RATS [VAZOAKTIVNYE PEPTIDY I STANOVLENIE NASLEDSTVENNO OBUSLOVLENNOI GIPERTONII U KRYs]**

V. V. KARPITSKII (Ialtinskii Nauchno-Issledovatel'skii Institut Fizicheskikh Metodov Lecheniya i Meditsinskoi Klimatologii, Yalta, Ukrainian SSR) and O. A. GOMAZKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), Mar.-Apr. 1984, p. 40-45. In Russian. refs

Two series of tests on normotensive Wistar-Kyoto rats and Okamoto-Aoki rats with hereditary hypertension, and from various age groups, are described and the results are reported. In the first series, the content of certain components (prekallikrein, the inhibitor of kallikrein, and kinogen) of the kallikrein-kinin system in the blood was determined. In the second series, the hemodynamic reactivity and the level of metabolic function of the lungs in response to the introduction of bradikinin or angiotensin I and II were measured. It is shown that the formation of spontaneously developing hypertension is preceded by changes in the activity of the kallikrein-kinin system, in the increased inactivation of the depressor, bradikinin, and in the increased reactivity of the lungs to this polypeptide.

J.N.

N84-23092\*# Star Enterprises, Bloomington, Ind.

**BEHAVIORAL BIOLOGY OF MAMMALIAN REPRODUCTION AND DEVELOPMENT FOR A SPACE STATION Final Report**

J. R. ALBERTS 1983 160 p

(Contract NASW-3745)

(NASA-CR-173493; NAS 1.26:173493) Avail: NTIS HC A08/MF A01 CSCL 06C

Space Station research includes two kinds of adaption to space: somatic (the adjustments made by an organism, within its lifetime, in response to local conditions), and transgenerational adaption (continuous exposure across sequential life cycles of genetic descendents). Transgenerational effects are akin to evolutionary process. Areas of a life Sciences Program in a space station address the questions of the behavioral biology of mammalian reproduction and development, using the Norway rat as the focus of experimentation.

B.G.

N84-23093\*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**MODULATED VOLTAGE METASTABLE IONIZATION DETECTOR Patent Application**

D. E. HUMPHRY, inventor (to NASA) 22 Feb. 1984 21 p

(NASA-CASE-ARC-11503-1; US-PATENT-APPL-SN-582643)

Avail: NTIS HC A02/MF A01 CSCL 06B

Metastable ionization detectors used for chromatographic analysis usually employ a fixed high voltage for the ionization potential. For this reason, the operation range is limited to about three orders of magnitude. By use of the technique disclosed in the instant invention, operating ranges of about nine orders of magnitude are obtained. The output current from a metastable

ionization detector is applied to a modulation voltage circuit. An adjustment is made to balance out the background current, and an output current, above background, is applied to an input of a strip chart recorder. For low level concentrations, i.e., low detected output current, the ionization potential will be at a maximum and the metastable ionization detector will operate at its most sensitive level.

NASA

N84-23094# University of South Florida, St. Petersburg. Dept. of Marine Science.

**THE BIOCHEMISTRY AND PHYSIOLOGY OF BACTERIAL ADHESION TO SURFACES Final Report, 15 Nov. 1982 - 15 Nov. 1983**

J. H. PAUL 20 Jan. 1984 53 p

(Contract N00014-83-K-0024)

(AD-A138271; AD-E950472) Avail: NTIS HC A04/MF A01

CSCL 06M

The physiologic mechanisms involved in bacterial adhesion to inert surfaces have been investigated employing fouling isolates obtained from the Chesapeake Bay. Specifically, we have: (1) compared the physiologic activity of attached and free-living bacteria; (2) studied the effect of metabolic inhibitors on attachment to determine what physiologic processes were involved in adhesion; (3) investigated the type of material employed as the adhesive substance. We have developed two unique microfouling assays that employ the DNA-specific fluorochromes Hoechst 33528 and 33342. These two assays permit the sensitive and specific enumeration of attached populations of bacteria, and were used in the experiments described below. Actively growing cells from log-phase cultures of *Vibrio proteolytica* adhered in greater numbers than late stationary phase or mercuri chloride-killed cells. Cells that were starved by resuspension in nutrient-free medium became progressively less adhesive.

GRA

N84-24085# Mississippi State Univ., Mississippi State.

**BIOCHEMICAL STUDIES ON THE INITIATION OF ODOR SENSING Final Report, 1 Dec. 1979 - 30 Apr. 1983**

R. B. KOCH Jun. 1983 18 p refs

(Contract DAAG29-80-C-0033)

(AD-A129926; ARO-1687.5-LS) Avail: NTIS HC A02/MF A01

CSCL 06C

The basic biochemical events which are responsible for the initiation of the process of odor sensing were investigated to understand human ability to sense and identify an infinite number of odorous compounds. It was observed that even newly synthesized organic compounds with sufficient volatility at room temperature can be detected by the sense of smell. It is suggested that specific receptors for odorous chemicals cannot be preexistent in the olfactory epithelial tissue, and that odor sensing and identification is due to pattern recognition of multiple perturbations of nerve action potentials.

E.A.K.

N84-24086# Dayton Univ., Ohio.

**USER'S GUIDE FOR COMBIMAN PROGRAMS (COMPUTERIZED BIOMECHANICAL MAN-MODEL), VERSION 6 Interim Report**

P. BAPU, M. KORNA, and J. MCDANIEL Dec. 1983 310 p

(Contract F33615-81-C-0505; AF PROJ. 7184)

(AD-A139139; UDR-TR-83-51; AFAMRL-TR-83-097) Avail: NTIS HC A14/MF A01 CSCL 06B

This User's Guide describes the procedures to operate the Air Force Aerospace Medical Research Laboratory's (AFAMRL) Computerized Biomechanical MAN-model (COMBIMAN) programs. The Guide is based on programs as of 1 May 1981. The Guide includes an introduction to the man-model and the conventions used to develop and analyze crew station configurations. It also deals with the operations of the programs included in the COMBIMAN system. These programs include the interactive graphics program CBM06, and the three key data base creation/modification programs CBMAM, CBMCM, and CBMVM, which create and maintain the Data Bases of anthropometric surveys, crew station configurations, and visibility contour definitions respectively. The guide also contains a complete description of the use of CBM06F, the off-line plot program. The guide to operate

the four main programs includes descriptions of the processing capabilities for each program, definitions and examples of all input and output data formats, procedures to execute the programs, and explanations of all diagnostic messages generated by the programs. Author (GRA)

**N84-24087#** Washington Univ., Seattle. Bioelectromagnetics Research Lab.

**EFFECTS OF LONG-TERM LOW-LEVEL RADIOFREQUENCY RADIATION EXPOSURE ON RATS. VOLUME 5: EVALUATION OF THE IMMUNE SYSTEM'S RESPONSE** Final Report, Jun. 1980 - Feb. 1983

L. L. KUNZ, K. E. HELLSTROM, I. HELLSTROM, H. J. GARRIQUES, and R. B. JOHNSON Dec. 1983 44 p  
(Contract F33615-80-C-0612; AF PROJ. 7757)  
(AD-A138535; USAFSAM-TR-83-50) Avail: NTIS HC A03/MF A01 CSCL 06R

The immune system's response was evaluated in two groups of 10 rats each exposed to 2450-MHz 480-microWatts/sq cm RFR in circularly polarized waveguides for 21 h per day for 13 (Group 1) and 25 months (Group 2); two other groups of 10 rats each served as controls. Increases in the numbers of B- and T-cells and enhancement of the lymphocytic response to mitogen stimulation were seen in Group 1 but not in Group 2. The complement-receptor-positive cells and antibody formations were unaffected in both groups. GRA

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### AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

**A84-30010**  
**EFFECTS OF STOPPING EXERCISE TRAINING ON EPINEPHRINE-INDUCED LIPOLYSIS IN HUMANS**

W. H. MARTIN, III, E. F. COYLE, M. JOYNER, D. SANTEUSANIO, A. A. EHSANI, and J. O. HOLLOSZY (Washington University, St. Louis, MO) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 845-848. refs

The response of serum free fatty acid (FFA) and blood glycerol, lactate, and glucose to serial epinephrine infusions in trained men before and during a 55-day period (after termination of strenuous endurance training) were examined to determine whether endurance exercise training enhanced adipose tissue sensitivity to the lipolytic action of catecholamines. Epinephrine infusions, four days after training termination, effected smaller increases in FFAs ( $0.57 \pm 0.40$  vs.  $1.06 \pm 0.30$  mM) and blood glycerol ( $0.07 \pm 0.01$  vs.  $0.12 \pm 0.03$  mM), and a larger increase in blood lactate concentration ( $1.24 \pm 0.51$  vs.  $0.69 \pm 0.44$  mM). Catecholamine, glucose, and glucagon concentrations during infusion were not influenced by training termination. It was concluded that endurance exercise might have improved epinephrine-induced lipolysis, but that the effect was quickly lost after exercise termination. C.M.

**A84-30012**  
**HEAT EXCHANGE FOLLOWING ATROPINE INJECTION BEFORE AND AFTER HEAT ACCLIMATION**

M. A. KOLKA, W. L. HOLDEN, and R. R. GONZALEZ (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 896-899. refs

The effects of saline and atropine injections on eight healthy males walking on a treadmill in a hot-dry environment before and after heat acclimation were studied in order to quantify the combined effects of atropine injection and heat acclimation.

Analysis showed that stroke hazards caused by exercising in the heat after atropine application could be reduced by heat acclimation since the effective temperature was reduced by approximately 2.5 deg C. Also noted was that the atropine injection produced a decrease in skin wettedness levels as compared to the saline injection, and that once subjects overcame the transient effects of the atropine injection, heat acclimation also improved total work time. C.M.

**A84-30013**  
**EFFECT OF MILD ESSENTIAL HYPERTENSION ON CONTROL OF FOREARM BLOOD FLOW DURING EXERCISE IN THE HEAT**

W. L. KENNEY, E. KAMON, and E. R. BUSKIRK (Pennsylvania State University, University Park, PA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 930-935. refs

**A84-30014**  
**PEAK OXYGEN UPTAKE DURING ARM CRANKING FOR MEN AND WOMEN**

R. A. WASHBURN and D. R. SEALS (Wisconsin, University, Madison, WI) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 954-957. refs

**A84-30015**  
**EFFECTS OF ACUTE EXPOSURE TO HIGH ALTITUDE ON VENTILATORY DRIVE AND RESPIRATORY PATTERN**

N. K. BURKI (Kentucky, University, Medical Center, Lexington, KY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 1027-1031. refs

Six males ( $19.5 \pm 1.64$  years) were exposed to high altitude (3,940 m) in order to study the changes in ventilatory pattern and drive, as well as the effects of hyperoxia. The increase in expired minute ventilation ( $9.94 \pm 1.78$  to  $14.25 \pm 2.67$  l/min on day 3) was caused by an increase in respiratory frequency without a change in tidal volume. The increased frequency was produced by decreases in inspiratory (TI) and expiratory (TE) times, but TI/TE increased. The induction of hyperoxia for ten minutes at the high altitude did not alter the expired minute ventilation or the ventilatory pattern. It is concluded that normal subjects living at low altitude increase their ventilation when exposed to high altitude by primarily altering central breath timing. C.M.

**A84-30017**  
**LATENCY IN ONSET OF DECOMPRESSION SICKNESS ON DIRECT ASCENT FROM AIR SATURATION**

R. G. ECKENHOFF and J. W. PARKER (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, CT) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, April 1984, p. 1070-1075. Navy-supported research. refs

The latency of symptomatology, venous gas emboli (VGE), and pruritus was studied in 24 human subjects exposed to compressed air at simulated depths of 45, 55, 65, and 75 feet seawater gauge (fsw) for time periods sufficient to permit inert gas saturation of most tissues. In the ascending excursion from 45 fsw, the mean appearance times of pruritus and VGE were  $19.3 \pm 7.5$  and  $21.9 \pm 7.4$  minutes. From 75 fsw, times were  $4.8 \pm 0.8$  and  $8.2 \pm 1.2$ . There was one instance of pain-only decompression sickness in either case. It is concluded that after direct ascent from air saturation, a latency period exists regarding gas phase formation and symptomatology. Applications include emergency decompression or nonpressurized transfer between pressurized environments (e.g., during space flight operations). It is also suggested that surface excursions from air saturation exposures are safe from greater depths than previously indicated. C.M.

**A84-30326**

**SPACE PHYSIOLOGY; COLLOQUIUM, TOULOUSE, FRANCE, MARCH 1-4, 1983, PROCEEDINGS [PHYSIOLOGIE SPATIALE; COLLOQUE, TOULOUSE, FRANCE, MARCH 1-4, 1983, PROCEEDINGS]**

Colloquium sponsored by the Centre National d'Etudes Spatiales. Toulouse, France, Cepadues-Editions, 1983, 493 p. In French and English.

Among the topics discussed with space applications are coordination and posture, adapting to weightlessness, the skeletal and cardiovascular systems, the fluid and electrolyte balance, and muscle training. Consideration is given to the vestibular function during parabolic flight, neural mechanisms of motion sickness, anticipatory postural movements related to voluntary movement, bone loss during weightlessness, and the treatment of acute osteoporosis due to paraplegia with calcitonin. Additional topics covered include the calcium permeability of sarcoplasmic reticulum in muscle fibers, the effect of renal functions, the heart rate response to an orthostatic test with an antigravity suit, and the 6709 centrifuge. C.M.

**A84-30327**

**COORDINATION BETWEEN MOVEMENT AND POSTURE [COORDINATION ENTRE MOUVEMENT ET POSTURE]**

J. MASSION (CNRS, Departement de Neurophysiologie Generale, Marseille, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 23-33. In French. Research supported by the Delegation Generale ala Recherche Scientifique et Technique, and Institut National de la Santeet de la Recherche Medicale. refs

Movement, posture, and equilibrium are defined and their functional characteristics are compared. The central organization of coordination is also covered. Under conditions of gravity, movements are accompanied by postural adjustments on account of static equilibrium and dynamic forces. A principal characteristic of postural adjustments is the anticipation generated to minimize the equilibrium and posture imbalance caused by a movement. In regard to the central organization of postural adjustments, it is proposed that a repertoire of postural stereotypes exists, localized at the level of medulla, the neocerebellum, or elsewhere. Adjustments could be effected by internal signals or environmental signals triggered by movements. C.M.

**A84-30328**

**THE TIMING OF NATURAL PREHENSION MOVEMENTS**

M. JEANNEROD (Institut National de la Santeet de la Recherche Medicale, Bron, Rhone, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 35-61. refs

Transportation and manipulation components of prehension are analysed alone and in coordination, and the onset of the closure phase is used as a quantifiable index of manipulation timing. It is demonstrated that prehension involves in a limited sense, because the synchrony of transportation and manipulation components is reduced to a few points on the time axis, a common timing of its different components. Consequently, the theory that a mechanism maintains temporal invariance of complex goal-directed actions for coordination between moving segments is supported. By varying the degree of visual feedback available from the moving limb, the significance of vision during coordination and control of segmental components is studied. The importance of vision control in improving movement accuracy is confirmed. However, it is also shown that vision does not affect movement patterning and intersegmental coordination. C.M.

**A84-30329**

**EYE-HEAD COORDINATION - NEUROLOGICAL CONTROL OF ACTIVE GAZE**

L. W. STARK (California, University, Berkeley, CA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 63-75. refs

Principles of movement are reviewed, head movement is compared to eye and arm movements, and the interaction between eye and head movement that produces coordinated gaze (eye-in-space) movement is described. Consideration is given to visual feedback, neuromuscular elements and the mechanical load, the multipulse shaper, the stretch reflex, the sampled data model for control of neurologically ballistic movements, sensory mechanisms, and higher level learning and adaptation. Studies of horizontal head rotation control covered substantiate that the EMG is an apposite sample of the neurological control signal. Finally, the factors affecting higher level control of head and eye latencies are discussed, as well as the synchronous eye neck EMG gaze types I, II, and III. C.M.

**A84-30330**

**PLANE SPECIFICITY IN VISUO-MOTOR MECHANISMS DURING VISUAL-VESTIBULAR CONFLICTS [ASPECTS GEOMETRIQUES DE L'ADAPTATION VISUO-MOTRICE LORS DES CONFLITS VISUO-VESTIBULAIRES]**

A. BERTHOZ and J. DROULEZ (CNRS, Laboratoire de Physiologie Neurosensorielle, Paris, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 77-94. In French. refs

Experiments which emphasize the plane specificity of control systems of vestibulo-ocular reflexes were reviewed, along with some of the objectives and experimental devices of the fall 1983 Spacelab mission. A vestibulo-ocular reflex experiment in three planes of rotation during prolonged wearing of Dove prisms demonstrated a considerable gain adaptation, specific to the prism-produced visual environment transformation. Attention was also given to the adaptive modification of eye-head coordination, and the importance of visual control of the head during the final landing of trampoline jumps. For visual control during these fast and complex body movements, a relative angular stabilization of the head is required. Spacelab objectives covered include determining the threshold of linear acceleration perception, examining physiological responses and perception of linear angular acceleration, and using a camera that simultaneously measures horizontal and vertical components and torsion of ocular movements. C.M.

**A84-30331**

**FLEXIBILITY OF POSTURAL 'REFLEXES' UNDER DIFFERENT FUNCTIONAL DEMANDS**

J. DICHGANS and H. C. DIENER (Tuebingen, Universitaet, Tuebingen, West Germany) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 97-104. Sponsorship: Deutsche Forschungsgemeinschaft. refs (Contract DFG-DI-27811-2)

The reflex-like muscular pattern of the lower leg muscles was studied using EMG responses to determine flexibility in the amplitude and timing under various functional demands. A sudden tilt toe-up of a measuring platform around the axis of the ankle joint produced a regular pattern of short and medium latency responses in the stretched triceps surae muscle and long latency responses in the antagonistic anterior tibial muscle. A platform tilt-down effected a medium latency response in the anterior tibial muscle and a long latency response in the triceps surae. Leaning backwards or forwards before the tilt altered the timing of postural responses. Initial body position also affected the amplitude of EMG responses. Also noted was that changing the platform tilt's amplitude increased the medium latency response but did not alter the integrated EMG of the short latency response. C.M.



**A84-30332****POSTURAL CONTROL IN WEIGHTLESSNESS [CONTROLE DE LA POSTURE EN MICROGRAVITE]**

G. CLEMENT, F. LESTIENNE (CNRS, Laboratoire de Physiologie Neurosensorielle, Paris, France), V. S. GURFINKEL, M. I. LIPSHITS, and K. E. POPOV (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 105-118. In French. refs

In the context of sensory-motor interactions associated with postural control, adaptation of postural adjustments involved with voluntary elevation of the arm or the whole body were studied during a seven day spaceflight. At the beginning of the spaceflight, a strong forward inclination and a redistribution of electromyographic activities of the flexor and extensor muscles of the ankle were observed. After three days, a terrestrial posture was assumed during normal vision conditions, demonstrating the importance of vision for the recalibration of sensory systems affected by microgravity. According to a body scheme hypothesis, modification of the functioning point of the receptors involved in postural control does not notably affect postural adjustment observed in microgravity. C.M.

**A84-30333\* Massachusetts Inst. of Tech., Cambridge.****SPACE MOTION SICKNESS AND VESTIBULAR ADAPTATION TO WEIGHTLESSNESS**

L. R. YOUNG (MIT, Cambridge, MA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings Toulouse, France, Cepadues-Editions, 1983, p. 119-127. refs (Contract NAS9-15343; NAS9-16523; NASW-3651)

Theories of space motion sickness are discussed together with near future vestibular experiments for three Spacelab missions. The sensory conflict theory is covered, as well as theories involving unequal otolith masses, semicircular canals, cardiovascular adaptation and fluid shift toward the head, and extra-labyrinthine effects. Experiments will test the hypothesis that the sensitivity of the otolith organ response is shifted during weightlessness and that this shift carries over to the post-flight experience. Visual-vestibular-tactile interaction, vestibulo-ocular reflexes, ocular counterrolling, awareness of body position, otolith-spinal reflexes, and motion sickness susceptibility are among the parameters to be studied. Preflight and postflight tests will emphasize evaluation of any residual effects of the seven day weightless exposure on vestibulo-spinal and vestibulo-ocular pathways. C.M.

**A84-30335****ANTICIPATORY POSTURAL MOVEMENTS RELATED TO A VOLUNTARY MOVEMENT**

S. BOUISSET and M. ZATTARA (Paris XI, Universite, Orsay, Essonne, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 137-141. refs

In the context of postural movements, the EMG anticipatory sequence was described and the biomechanical organization was analyzed. Antepulsion-flexion movements of the upper limbs were investigated during the following conditions: (1) unilateral flexions without additional inertia, (2) unilateral flexions with additional inertia, and (3) bilateral flexions. It was determined that movements of the body's center of gravity precede voluntary elevation of the upper limb. The anticipatory movements of the lower limbs, pelvis, trunk, and shoulders were found to be organized in a consistent pattern specific to the forthcoming movement, and consequently considered as preprogrammed. In addition, the anticipatory postural changes were directly opposed in effect to the forthcoming movement to minimize postural disturbance. C.M.

**A84-30337****SIMULATION OF THE PHYSIOLOGICAL MECHANISMS OF THE SPACE MOTION SICKNESS [SIMULATIONS DES MECANISMES PHYSIOLOGIQUES DE LA NAUSEE]**

C. GAUDEAU, P. LEGOFF (Tours, Universite, Tours, France), Y. TOSHEV (B'lgarska Akademiia na Naukite, Institut po Mekhanika i Biomekhanika, Sofia, Bulgaria), and C. SAHAGHIAN IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 151-166. In French. refs

Space motion sickness is a complex affliction whose symptoms encompass the autonomic nervous system and perceptual, vestibular, postural and digestive phenomena. It is indicated by computer simulation studies of space motion sickness that some physiological aspects, such as those of digestive mechanoreceptors, must not be neglected. O.C.

**A84-30338****CROSS POWER SPECTRAL ANALYSIS OF THE VESTIBULAR-OCULAR REFLEX**

A. MANSSON, S. VESTERHAUGE, and K. ZILSTORFF (Rigshospitalet, Copenhagen, Denmark) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 167-171. Research supported by the Danish Space Board. refs

The cross power spectral analysis is one of the modern techniques to examine linear or almost linear input-output systems, this includes many physiological systems. Gain and phaseshift is calculated at different frequencies within the frequency range of the system. Nonlinearities and/or noise components in the output can be evaluated in terms of spectral purity or coherence functions. The stimulus or input signals may be chosen almost freely. It can be single sinusoids, different types of noise or pseudonoise. Use is made of a pseudorandom sinus sequence (PRSS) composed of half sinus waves at several discrete frequencies connected to each other at their maximal amplitude. Author

**A84-30341****VESTIBULAR FUNCTION DURING PARABOLIC FLIGHT**

S. VESTERHAUGE, A. MANSSON, and T. STAEHR JOHANSEN (Rigshospitalet, Copenhagen; Royal Danish Air Force, Vedbaek, Denmark) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 195-197. Research supported by the Danish Space Board.

Weightlessness and two G environment was created during parabolic flights and during 60 deg turns, respectively, in a Saab Supporter aircraft. During these maneuvers, the compensatory oculomotor response to 0.4 Hz horizontal head rotations was recorded. The gain of the response was significantly reduced during weightlessness and significantly increased during two G influence. No significant change in the phase response could be observed. The gain variation might be of importance for the development of vertigo in unusual G environments and for the development of space motion sickness during orbital flight. Author

**A84-30342\* National Aeronautics and Space Administration, Washington, D. C.****WEIGHTLESSNESS AND BONE LOSS IN MAN**

P. C. RAMBAUT (NASA, Washington, DC) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 201-208. refs

A review is presented of data which has been accumulated on the calcium and skeletal changes occurring in humans subjected to various periods of weightlessness. These data reveal that spaceflight induces an overall loss of calcium which continues unabated for at least three months. Urinary calcium levels reach a constant level within approximately four weeks while fecal calcium losses continue to increase throughout the flight period. A decline in the mineral density of weight-bearing bones accompanies these changes. Available data support the contention that the demineralization affects primarily the weight bearing bones. The rates of loss and recovery of calcium and bone mineral density

are approximately equal to those observed during and following bedrest of comparable duration. No measure to wholly prevent these losses has yet been devised. Author

**A84-30344**

**TRABECULAR-BONE MODIFICATIONS INDUCED BY IMMOBILIZATION [LES MODIFICATIONS DE L'OS TRABECULAIRE INDUITES PAR L'HYPODYNAMIE]**

P. MINAIRE (Centre Hospitalier Regional Universitaire, Saint-Etienne, France), C. EDOUARD, and P. MEUNIER (Institut National de la Santeet de la Recherche Medicale, Lyon, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 215-222. In French. refs

The changes which occur in the structure and metabolism of trabecular bones as a result of reduced mobility are characterized in a review of clinical histomorphometric studies, animal experiments, and human and animal investigations performed in space. The similarities and differences between immobilization and weightlessness are examined, and further space research to improve understanding of the processes involved and develop effective countermeasures is urged. T.K.

**A84-30345**

**ESTIMATION OF THE EFFECTS OF SPACE FLIGHT ON THE METABOLISM OF BONE-TISSUE COMPONENTS [ESTIMATION DES EFFETS D'UN VOL SPATIAL SUR LE METABOLISME DE COMPOSANTS DU TISSU OSSEUX]**

J. FREY, A. CHAMSON, and C. PERIER (Saint-Etienne, Universite, Saint-Etienne, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 223-227. In French. refs

The urinary excretion of the bone-tissue metabolic products Ca, dialyzable hydroxyproline (DOHPr), and total OHPr was measured in three healthy males before and after the 8-day Salyut-7 space mission. Ca and total OHPr excretion increased significantly after the flight, but DOHPr excretion was unaffected. T.K.

**A84-30346**

**EXCRETION OF GLYCOSAMINOGLYCANS (GAG) IN SUBJECTS HAVING EXPERIENCED WEIGHTLESSNESS AND IN IMMOBILIZED PATIENTS WITH SPINAL CORD INJURIES**

G. PILONCHERY, G. GOEDERT, A. REVOL (Hopital Henry Gabrielle, Saint-Genis-Laval, Rhone, France), P. MINAIRE (Hopital Bellevue, Saint-Etienne, France), I. POPOVA, B. DOROKHOVA, and A. GRIGOREV IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 229-237. refs

The urinary excretion of GAGs, Ca, and hydroxyproline is measured in 53 patients with spinal-cord injuries leading to immobilization, in three cosmonauts who made a 7-day space flight, and in three cosmonauts who did not make the flight. The results are presented in graphs and tables. The GAG excretion of the immobilized patients (per gram of creatinine excreted) exhibited a threefold increase during the first five months after injury and was accompanied by sharp increases in hydroxyproline and Ca excretion; no changes were observed in the astronauts, with the exception of increased calciuria after the flight. The need for studies of a wider range of metabolic parameters is indicated. T.K.

**A84-30349**

**THE EFFECT OF IMMOBILIZATION AND TRAINING ON STRENGTH AND COMPOSITION OF HUMAN SKELETAL MUSCLE**

L. HERMANSEN, N. K. VOLLESTAD, O. GRONNEROD (Institute of Muscle Physiology, Oslo, Norway), P. H. STAFF, and O. A. DALJORD (Ullevaal Hospital, Oslo, Norway) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 255-266. Research supported by the Ministry for Local Government and Labour; Norges Teknisk-Naturvitenskapelige Forskningsrad. refs (Contract NTN-11745)

The response of human skeletal muscle to immobilization or endurance training is characterized in a review of clinical and experimental studies. Training is found to increase muscle size and strength by increasing the cross-sectional area of the individual fibers, and to increase the percentage of type IIA and IIB fibers relative to IIB; immobilization has the opposite effects. The percentage of type I fibers and the total number of fibers are unaffected by either procedure. T.K.

**A84-30350**

**TREATMENT OF ACUTE OSTEOPOROSIS DUE TO PARAPLEGIA WITH CALCITONIN**

P. MINAIRE, J. DEPASSIO, P. MEUNIER, C. EDOUARD, F. CAULIN, G. PILONCHERY, and D. A. JULIEN (Saint-Etienne, Universite; Hopital Bellevue, Saint-Etienne, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 267-272. refs

The effect of treatment with 100 UI of calcitonin every 3 days for 100 days (beginning within 10 days of injury) on the acute osteoporosis associated with paraplegia is investigated in a clinical study of 17 treated patients and 17 controls. Biochemical and bone-biopsy tests are performed, and the results are presented in a table and discussed. Calcitonin is found to prevent acute trabecular bone loss. T.K.

**A84-30351**

**NEW APPROACH OF BONE HISTOPHYSIOLOGY IN DEMINERALIZATION STATES - HISTOENZYMOLOGICAL DETECTION OF OSTEOCLASTIC ACID PHOSPHATASE ON UNDECALCIFIED HUMAN BONE BIOPSIES [NOUVELLE APPROCHE DE L'HISTOPHYSIOLOGIE OSSEUSE DANS LES OSTEOPATHIES RAREFIANTES - LA DETECTION HISTO-ENZYMOLOGIQUE DE LA PHOSPHATASE ACIDE OSTEOCLASTIQUE SUR BIOPSIES OSSEUSES NON DECALCIFIEES]**

D. CHAPPARD, C. ALEXANDRE, P. MINAIRE, G. RIFFAT (Saint-Etienne, Universite, Saint-Priest-en-Jarez, Loire, France), M. CAMPS, and J. P. MONTHEARD (Saint-Etienne, Universite, Saint-Etienne, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 273-281. In French. refs

**A84-30352**

**MYOSIN ATPHASE HISTOCHEMISTRY AND INTERMEDIATE FIBER TYPES IN HUMAN SKELETAL MUSCLE**

M. GRANDMONTAGNE (Lyon I, Universite, Lyon, France) and O. VAAGE (Institute of Muscle Physiology, Oslo, Norway) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 283-289. refs

**A84-30354**

**CALCIUM PERMEABILITY OF SARCOPLASMIC RETICULUM IN HUMAN MUSCLE FIBRES**

Y. MOUNIER and C. GOBLET (Lille I, Universite, Villeneuve-d'Ascq, Nord, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 299-305. refs

Caffeine-induced contractures of 'chemically skinned' preparations of normal human skeletal muscle were used to analyze



Ca(2+) regulation by the sarcoplasmic reticulum. A major goal of this study was to establish criteria by which single-fiber preparations could be used to control sarcoplasmic reticulum function in abnormal conditions. The caffeine threshold, the caffeine dose-response curve and kinetics of Ca(2+) uptake were determined. Amplitude, time to peak and rate of relaxation of caffeine tensions depend on caffeine concentration and on the Ca(2+) accumulated by the sarcoplasmic reticulum. Author

**A84-30357\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.  
**BED-REST STUDIES - FLUID AND ELECTROLYTE RESPONSES**

J. E. GREENLEAF (NASA, Ames Research Center Laboratory of Human Environmental Physiology, Moffett Field, CA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 335-348. refs

Confinement in the horizontal position for 2 to 3 weeks results in a chronic decrease in plasma volume, increased interstitial fluid volume, and unchanged or slightly increased extracellular fluid volume. Concentrations of blood electrolytes, glucose, and nitrogenous constituents remain within normal limits of variability when maintenance levels of isometric or isotonic exercise are performed for 1 hr/day. Hematocrit and plasma osmolality can be elevated significantly throughout bed rest (BR). Significant diuresis occurs on the first day, and increases in urine Na and Ca continue throughout BR, although voluntary fluid intake is unchanged. Urine Na and K are evaluated during the second week of BR in spite of stabilization of PV and extracellular volume. The initial diuresis probably arises from extracellular fluid while subsequent urine loss above control levels must come from the intracellular fluid. Preservation of the extracellular volume takes precedence over maintenance of the intracellular fluid volume. The functioning of a natriuretic factor (hormone) to account for the continued increased loss of Na in the urine is suggested. Previously announced in STAR as N83-24160 A.R.H.

**A84-30358**  
**HORMONAL AND RENAL RESPONSES TO WATER IMMERSION**

M. EPSTEIN (Miami, University; U.S. Veterans Administration Medical Center, Miami, FL) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 349-352. refs

The responses of the human Na-excretion, renin-aldosterone, and renal prostaglandin-excretion systems to water immersion to the neck are characterized in a summary of the author's recent experimental studies. The natriuretic response is found to be higher in Na-replete as in Na-depleted subjects, related to the increase in central blood volume, and separate from the concomitant diuresis (suggesting increased tubular rejection of Na as the mechanism). Immersion produces a progressive decrease in plasma renin activity (to 38 percent of the preimmersion value) and in plasma aldosterone (to 34 percent) and an increase in renal excretion of prostaglandin E, while plasma 17-hydroxycorticosteroid is unaffected. Bioassays of urine fractions in unilaterally nephrectomized rats indicate increased activity of a humoral natriuretic factor. These findings are considered applicable to the study of microgravity effects in space flight. T.K.

**A84-30359**  
**FLUID-ELECTROLYTE METABOLISM IN SPACE FLIGHTS OF VARYING DURATION**

A. I. GRIGOREV and B. R. DOROKHOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 353-360. refs

The results of water, K, and Ca loading tests on 43 cosmonauts before and after space flights of from 2 to 185 days are presented in tables and compared to those obtained in 60 patients subjected to bed rest of up to 182 days. After long-term flights, decreased

urine-concentration capacity and increased K and Ca excretion are observed. In the bed-rest studies, increased serum aldosterone and insulin are found after KCl loading, marking the body's effort to maintain electrolyte balance in the blood. The negative ion balance in weightlessness is attributed to decreased ion-pool capacity, which leads to a reduction in the ability of the tissues to retain electrolytes. T.K.

**A84-30361**  
**EXERCISE AND HEAT STRESS IN SIMULATED ZERO-G DURING WATER IMMERSION**

F. BONDE-PETERSEN, B. NIELSEN (Copenhagen, University, Copenhagen, Denmark), and L. B. ROWELL (Washington, University, Seattle, WA) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 401-408. Research supported by the Danish Space Board, Statens Laegevidenskabelige Forskningsrad, and Danish Sports Research Council. refs

The effect of water immersion (to the level of the xiphoid process) or wearing a water-perfused suit on the cardiovascular response to bicycle-ergometer exercise (at about 50 percent of maximal oxygen consumption rate) and/or heat stress (45 C air) is measured in eight healthy male subjects. Esophageal (core) temperature (Tc), ye heart rate, cardiac output, forearm blood flow (FBF), and stroke volume are measured, and the results are presented graphically. In air, FBF increases as Tc increases to 38 C but then levels off as Tc continues to increase; with immersion, FBF increases continuously with Tc. In general, immersion permits better accommodation (with higher cardiac output and peripheral circulation) to the effects of exercise and heat by preventing hydrostatic shifts of the peripheral venous volume. The implications for space-flight exercise are indicated. T.K.

**A84-30362**  
**GRAVITATIONAL EFFECT ON AEROBIC MUSCLE TRAINING**  
 T. FUKUNAGA, K. HYODO, T. RYUSHI, A. MATSUO (Tokyo, University, Tokyo, Japan), H. YATA (Wako University, Tokyo, Japan), and M. KONDO (Nihon University, Tokyo, Japan) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 409-414. refs

Muscle blood flow, partial O2 pressure, muscle O2 uptake, blood lactate concentration, and arm work capacity (hand-grip exercise at 1/3 maximum voluntary strength 30 times/min until exhaustion) were measured in 10 healthy male subjects with the arm in horizontal (heart-level) and vertical (raised) position, before and after 12 weeks of training exercises (3 times/week). Five subjects trained in the horizontal arm position; five, in the vertical. The results are presented graphically and discussed. Before training, all measured parameters were lower for the vertical arm position except blood lactates, which were increased. While training improved the performance and blood supply to the arm for both subject groups and both test conditions, the subjects trained with arms raised had greater improvement: this difference is attributed to greater capillarization of the forearm muscle. T.K.

**A84-30363**  
**EFFECTS OF A 7-DAY HEAD-DOWN TILT WITH AND WITHOUT CLONIDINE ON VOLUME-REGULATING HORMONES IN NORMAL HUMANS**

A. GUELL, A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France), G. GAUQUELIN, M. VINCENT, G. ANNAT, A. M. ALLEVAR, CL. GHARIB, CH. A. BIZOLLON (Lyon I, Universite, Lyon, France), and J. J. LEGROS (Centre Hospitalier Universitaire Sart Tilman, Liege, Belgium) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 415-425. Research supported by the Centre National d'Etudes Spatiales and Universite Lyon I. refs

Plasma renin activity, aldosterone, Na, K, neurophysin I, hematocrit, and osmolality and urinary Na, K, osmolality, and arginine vasopressin are measured before and during 7 days of -4-deg head-down tilt in three healthy male subjects receiving 450

microgram/day of clonidine and in three control subjects. The results are presented in graphs and discussed. The increases in renin, aldosterone, hematocrit, and neurophysin I and decreases in plasma Na and osmolality and urinary Na and K found in the controls were effectively suppressed by clonidine, and the excretion of arginine vasopressin was decreased. It is suggested that clonidine may be a useful countermeasure adding similar effects in weightlessness, although it must be noted that the increase in central venous pressure caused by head-down tilt is of short duration (about 3 h), as also found by Nixon et al. (1979) and Katkov et al. (1982). T.K.

**A84-30364****EFFECTS OF A FOUR DAY HEAD-DOWN TILT ON THE URINARY EXCRETION OF PROSTAGLANDINS**

D. BENZONI, G. GAUQUELIN, M. VINCENT, N. GALLO-BONA, C. GHARIB (Lyon I, Universite, Lyon, France), A. GUELL, A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France), and A. SASSOLAS (Hopital Neurologique, Lyon, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 431-437. Research supported by the Centre National d'Etudes Spatiales, Centre National de la Recherche Scientifique, and UniversiteLyon I. refs

Urinary excretion of Na, K, and prostaglandins PGE and PGF-alpha is measured before and during 4 d of -6-deg head-down tilt in four healthy male subjects at rest and in four subjects submitted to supine bicycle exercise (at 50 percent of maximum O2 uptake) for 1 h, once a day on the control day and day 1 and twice a day on days 2, 3, and 4. The results are presented in graphs and tables. It is shown that head-down tilt with or without exercise causes significant decreases in urine volume, urinary Na, and the Na/K ratio without affecting the excretion of PGE and PGF-alpha. T.K.

**A84-30365****NEURO-CIRCULATORY MODIFICATIONS CAUSED BY PROLONGED ANTI-ORTHOSTATIC POSITION AT -4 DEG**

A. GUELL, A. ROUS DE FENEYROLS, B. COMET, PH. DUPUI, G. GERAUD, and A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 439-445. refs

The circulatory and neurological effects of 7-day -4-deg head-down tilt are investigated experimentally in three young volunteers. The objective and subjective symptoms reported by astronauts are duplicated, and the speed and accuracy of performance on perception tests are impaired. It is noted that the effects of head-down tilt begin to disappear after 4-5 days, while the similar effects of weightlessness persist. T.K.

**A84-30366****EFFECT OF GRAVITY ON MUSCLE WORK PERFORMANCE AND EXERCISE METABOLISM**

H. YATA (Wako University, Tokyo, Japan), T. FUKUNAGA, A. MATSUO, and K. HYODO (Tokyo, University, Tokyo, Japan) IN: Space Physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 447-452. refs

The effects of arm position on work performance and exercise metabolism of human muscle were studied. Parameters measured in six males exercising with hand grips until exhaustion included forearm muscle blood flow, O2 and CO2 pressure and content in venous blood, muscle oxygen consumption and blood lactate, pyruvate, and glucose levels. When the exercise was performed with the arm elevated vertically as opposed to at heart level, maximum work done and muscle blood flow decreased by approximately 10 and 30 percents. It was concluded that this decrease in muscle work performance was caused by a diminution of muscle blood flow, produced by the reduced transmural pressure in elevated arm vessels. C.M.

**A84-30367****TIME COURSE OF PLASMA LEVELS OF NOREPINEPHRINE, EPINEPHRINE AND DOPAMINE DURING A 4-DAY HEAD-DOWN TILT**

J. M. PEQUIGNOT, L. PEYRIN, G. GAUQUELIN, M. H. MAYET, C. GHARIB (Lyon I, Universite, Lyon, France), A. GUELL, J. L. BASCANDS, and A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 453-459. Research supported by the Centre National d'Etudes Spatiales, Centre National de la Recherche Scientifique, and UniversiteLyon I. refs

The changes in sympatho-adrenal activity during a -6 deg head-down tilt were assessed in eight healthy men by measuring plasma norepinephrine (NE), epinephrine (E) and dopamine (DA). Plasma catecholamine (CA) levels were unaltered after short-term (from 30 min to 10 h) or long-term (from 1 to 4 days) head-down tilt, and the association of regular exercise (50 percent VO2 max) with the tilt did not affect the results. These findings suggest that sympatho-adrenal activity is not significantly modified by head-down tilt at -6 deg. Author

**A84-30369****ANALYSIS OF TRANSIENT HEART RATE RESPONSE TO ORTHOSTATIC TEST WITH AND WITHOUT ANTIGRAVITATIONAL TROUSERS**

A. W. PRZYBYSZEWSKI, J. HALAMEJKO, M. SMIETANOWSKI, and A. TRZEBSKI (Akademia Medyczna; Warszawa, Politechnika, Warsaw, Poland) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 471-477. refs

Heart rate, end-tidal PCO2, and respiratory amplitude are measured in 10 male subjects during sudden tilt-table change from horizontal to vertical position and vice versa, with and without anti-G trousers. Spectral analysis of the sinus arrhythmia is performed as a measure of dynamic changes in the cardiovascular system. Anti-G trousers are found to suppress a class of asynchronic heart-rate oscillations in the vertical-to-horizontal tests. T.K.

**A84-30371****NONINVASIVE AND CONTINUOUS MEASUREMENT OF THE SKIN BLOOD FLOW IN MAN [MESURE NON INVASIVE EN CONTINU DE L'IRRIGATION SANGUINE CUTANEE CHEZ L'HOMME]**

A. DITTMAR, G. DELHOMME (Lyon I, Universite, Lyon, France), and B. ROUSSEL (Service de Santes Armees, Centre de Recherches, Lyon, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings . Toulouse, France, Cepadues-Editions, 1983, p. 487-493. In French. refs

The application of a 20-mm-diameter 4-mm-thick thermal-conductivity probe (Dittmar et al., 1982) to the measurement of human skin circulation is described. The current required to keep the probe center at a temperature 2 C higher than that at the probe edge is measured, and calibration is achieved using physical models. The effectiveness of the technique is demonstrated in measurements of the effects of arm posture, the Walsava maneuver, ambient temperature changes, body posture, the sleep-waking cycle, and vasodilators on the skin blood flow in the hand or forehead. The applicability of the probe to space experiments is suggested. T.K.

**A84-30796****THEORETICAL AND PRACTICAL PROBLEMS IN HUMAN ADAPTATION TO HIGH LATITUDES [NEKOTORYE TEORETICHESKIE I PRIKLADNYE VOPROSY ADAPTATSII CHELOVEKA V VYSOKIKH SHIROTAKH]**

L. E. PANIN IN: Problems in the ecology of polar regions (Problemy ekologii poliarnykh oblastei). Moscow, Izdatel'stvo Nauka, 1983, p. 45-59. In Russian. refs

In adapting to the complex of geographic and climatic factors that characterize high latitudes, changes are seen in the metabolism of proteins, fats, carbohydrates, vitamins, macronutrients, and

micronutrients. A distinctive polar metabolism develops, and a new level of homeostasis is established. The chemical composition of the body's internal medium is altered. Because of these changes, the norms that are used in evaluating the health of a person living in the middle or southern latitudes will not be applicable. The metabolic rearrangement is closely linked to changes in endocrine regulation. It is characterized by a higher concentration of catecholamines and glucocorticoids in the blood, the metabolic effect of these substances becoming more pronounced in connection with the development of functional diabetes. The lower concentration of insulin in the blood is seen as an expedient response of the organism, indicating a transition to a new level of regulation. C.R.

#### A84-30863

##### PROCEDURES FOR THE MEASUREMENT OF ACUTE MOUNTAIN SICKNESS

J. B. SAMPSON, A. CYMERMAN, R. L. BURSE, J. T. MAHER, and P. B. ROCK (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1063-1073. refs

This paper outlines a definition and procedures for an operational measurement of AMS (acute mountain sickness) using the Environmental Symptoms Questionnaire (ESQ). After 58 men completed over 650 ESQs during a stay of 1-3 weeks atop Pike's Peak (4300 m), factor analysis produced nine distinct symptom groups, with two factors representing AMS. The first factor contains symptoms indicative of cerebral hypoxia and is labeled AMS-C. The second reflects respiratory distress and is called AMS-R. Signal detection theory was used to establish a criterion score value for each factor. Standard deviation values were used to derive indices of sickness severity. Attention is given to the possible relationships between the two types of AMS and the more serious conditions of cerebral and pulmonary edema. Author

#### A84-30864

##### EFFECTS OF CARBON DIOXIDE INHALATION ON PHYSIOLOGICAL RESPONSES TO COLD

J. A. WAGNER, K. MATSUSHITA, and S. M. HORVATH (California, University, Santa Barbara, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1074-1079. refs

(Contract AF-AFOSR-78-3534; NIH-RR-07099-15; NIH-AG-01030-01A3)

Experiments were conducted to assess the thermoregulatory effects of CO<sub>2</sub> breathing during cold exposures. Four men and two women (19-35 yrs old), clad in bathing suits, rested for 75 min on three occasions in a thermoneutral environment (29 C) and on three occasions in the cold (5 C). During these exposures the subjects breathed either: (1) air for 75 min, (2) air from 0-30 min, 4 percent CO<sub>2</sub> in air from 30-60 min, and air from 60-75 min, or (3) 4 percent CO<sub>2</sub> from 0-60 min and air from 60-75 min. Oxygen uptake was higher at 5 C than at 29 C due to shivering, but was not significantly effected by CO<sub>2</sub> breathing. Rectal temperatures (Tre) were always higher in subjects exposed to 5 C than 29 C, declining with exposure time. Breathing 4 percent CO<sub>2</sub> resulted in an acceleration in the decline of Tre in both environments. Neither oxygen-uptake measurements nor accelerometer recordings of shivering supported previous reports of CO<sub>2</sub>-induced suppression of shivering. However, enhanced shivering may have occurred after cessation of CO<sub>2</sub> breathing. Calculations of partitioned heat exchange indicated that the greater decreases in Tre observed during CO<sub>2</sub> exposures were due mainly to increased respiratory evaporative heat loss, total convective and conductive heat loss, probably all the result of hyperventilation. Author

#### A84-30870

##### NON-EJECTION CERVICAL SPINE FRACTURE DUE TO DEFENSIVE AERIAL COMBAT MANEUVERING IN AN RF-4C - A CASE REPORT

D. G. SCHALL (USAF, School of Aerospace Medicine, Brooks AFB, TX) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1111-1116.

An unusual case report is presented describing an incident in which an RF-4C instructor pilot fractured three cervical vertebrae after impacting the rear canopy top during a negative G defensive maneuver. The pilot subsequently developed an incomplete tetraparesis later in flight and the aircraft had to be recovered by the front seat pilot. No similar cases have ever been reported to the USAF Safety Center or described in the aviation literature.

Author

#### A84-30871

##### THE AVIATOR AFTER NISSEN REPAIR - GAS BLOAT AND OTHER PERILS

J. P. DURNING and M. J. TORMA (USAF, Medical Center, Keesler AFB, MS) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1117, 1118. refs

The postoperative experiences of a high-performance pilot who underwent Nissen fundoplication for reflux esophagitis illustrate two important points concerning return to flying duties. Both the gas bloat syndrome and obstructive phenomena are potential sequelae to surgery. Both have obvious implications for flight personnel. A logical approach for flight medical officers is presented. Author

#### A84-30872

##### TOTAL COLECTOMY WITH MUCOSAL PROCTECTOMY AND ILEOANAL ANASTOMOSIS - AN IMPORTANT SURGICAL OPTION IN THE AVIATOR WITH PREMALIGNANT DISEASE OF THE COLON

D. COUNTRYMAN, H. D. ROBERTSON, and M. J. TORMA (USAF, Medical Center, Keesler AFB, MS) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1119-1122. refs

#### A84-31109\*

##### Boston Univ., Mass. GROWTH RATE OF LOUDNESS, ANNOYANCE, AND NOISINESS AS A FUNCTION OF TONE LOCATION WITHIN THE NOISE SPECTRUM

R. P. HELLMAN (Boston University, Boston, MA) Acoustical Society of America, Journal (ISSN 0001-4966), vol. 75, Jan. 1984, p. 209-218. refs

(Contract NSG-1644)

Absolute magnitude estimation methods were used to investigate the relation between the overall perceived magnitude of noise tone complexes and the location of the tone within the spectrum. In contrast to 'noisiness', loudness and annoyance growth behavior depends on the relationship of the single tones added to low- and high-pass noises in these tests, and to the spectral shape of the noise. Tones centered in noise produce nonmonotonic loudness and annoyance growth functions, while those added to the noise skirt produce power functions. Although a tone correction for annoyance is warranted for certain noise-tone configurations, none of the calculation procedures proposed can take all of the variables relevant to the perceived annoyance of tonal components into account. Complex auditory interactions generated by the simultaneous presentation of noise and tone can substantially account for the effects observed. O.C.

A84-31199

**VERTEBRAL STATIC IN THE POSTURE OF FIGHTER AND HELICOPTER PILOTS [STATIQUE VERTEBRALE EN POSITION DE PILOTAGE DES PILOTES DE CHASSE ET D'HELICOPTERE]**

J. L. POIRIER (Service de Santes des Armees, Paris; Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France), P. J. METGES (Service de Santes des Armees, Paris; Hopital d'Instruction des Armees Begin, Saint-Mande, Val-de-Marne, France), R. AUFFRET (Service de Santes des Armees, Paris, France), and R. P. DELAHAYE (Service de Santes des Armees, Metz, France) *Medecine Aeronautique et Spatiale*, vol. 23, 1st Quarter, 1984, p. 32-37. In French.

In order to determine posture factors influencing aircraft and helicopter seat comfort, French pilots rated the comfort of ejectable and helicopter seats in a variety of body position angles. Angles involved in seat comfort included the angle formed by the cervical-sacrum cord and the vertical, which indicated the thorax-pelvis inclination, and the angle produced by the extension of the lumbar cord and the femur, which indicated the force of the spine on the chair. It was determined that the nearer the cervical-sacrum cord was to a parallel straight line with the seat, the more comfortable the position. Also noted was that the back should not be too inclined, and that adjustable back inclines and seat heights were preferable. C.M.

A84-31259

**RETINAL INHOMOGENEITY. I - SPATIOTEMPORAL CONTRAST SENSITIVITY. II - SPATIAL SUMMATION**

D. H. KELLY (SRI International, Menlo Park, CA) *Optical Society of America, Journal, A: Optics and Image Science* (ISSN 0740-3232), vol. 1, Jan. 1984, p. 107-119. refs (Contract NIH-EY-01128)

The present study is concerned with the measurement of spatiotemporal sine-wave contrast thresholds at four retinal eccentricities, including 0 deg, 3 deg, 6 deg, and 12 deg. An important difference between the measurement procedure employed in this study and those of previous investigations is related to the control of fixation and eye-movement effects. When eye-movement effects are eliminated, the stimulus appears to fade and may disappear entirely unless some form of temporal variation is provided. In the conducted experiments, this temporal variation was introduced by flickering the circular pattern sinusoidally in counterphase. A third novel aspect of the employed procedure is concerned with the characterization of spatiotemporal interaction at each eccentricity. G.R.

A84-31260

**MODIFIED LINE-ELEMENT THEORY FOR SPATIAL-FREQUENCY AND WIDTH DISCRIMINATION**

H. R. WILSON and D. J. GELB (Chicago, University, Chicago, IL) *Optical Society of America, Journal, A: Optics and Image Science* (ISSN 0740-3232), vol. 1, Jan. 1984, p. 124-131. refs (Contract NSF BNS-81-13574)

Recent data from several laboratories have shown that spatial-frequency discrimination is not a smooth function of frequency but rather exhibits alternate peaks and troughs. A model for spatial-frequency discrimination analogous to line-element models for color discrimination is presented here and shown to provide a reasonable fit to the available data. This model is based on the predicted responses of six spatial-frequency-tuned mechanisms, whose sensitivity curves have been estimated in previously published masking experiments. In order to fit the data it is necessary to pool responses from units centered under the stimulus as well as from spatially neighboring units. Thus it appears that the visual system utilizes both spatial and spatial-frequency information in discrimination tasks. Author

A84-31274

**ORIENTATION DEPENDENCE OF VISUAL HYPERACUITY CONTAINS A COMPONENT WITH HEXAGONAL SYMMETRY**

J. HIRSCH (Yale University, New Haven, CT) and R. HYLTON (Columbia University, New York, NY) *Optical Society of America, Journal, A: Optics and Image Science* (ISSN 0740-3232), vol. 1, March 1984, p. 300-308. Research supported by the Connecticut Lions Eye Research Foundation Association. refs (Contract NIH-EY-00785; NIH-EY-00167; F49620-83-C-0026)

A84-31477

**INFLUENCE OF INSOLATION ON THE ULTRASTRUCTURE OF EPIDERMAL CELLS [VLIANIE SOLNECHNOI INSOLIATSII NA UL'TRASTRUKTURU KLETOK EPIDERMISA]**

V. I. SEMKIN and I. N. MIKHAILOV (Scientific Research Laboratory of Biological Structures, Moscow, USSR) *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Mar.-Apr. 1984, p. 250-258. In Russian. refs

Ultrastructural changes in insulated human epidermis, mechanisms of pigmentation intensification (tanning), and the recovery of initial skin color are investigated. Skin from the abdomen and shoulders of male subjects, corresponding to the seasonal periods of minimum pigmentation and maximum pigmentation, as well as skin biopsies obtained before and after summer sunning was studied. Electron microscopy of the sunburnt skin clearly shows that the melanocytes, in particular, are deeply embedded in the dermis in the form of distinctive finger-like diverticula, remaining isolated from the underlying dermis of the basal membrane. The ultrastructural organization of melanocytes in the dermis directly under the basal membrane is practically the same as that of the epidermal melanocytes. It is also shown that melanin may be synthesized in the keratinocytes of the basal layer of the epidermis. The use of electron magnetic resonance showed that only pigmented skin has a stable EMR signal. The marked ultrastructural changes noted in nearly all the intracellular components of epidermal keratinocytes and melanocytes are closely connected with their changing function under the influence of humoral, neural, and hormonal influences. J.N.

A84-31478

**FUNCTIONING OF THE VESTIBULAR APPARATUS AS A GYROSCOPIC SYSTEM UNDER BIPLANE ROTATION [O FUNKTSIONIROVANII VESTIBULIARNOGO APPARATA KAK GIROSKOPICHESKOI SYSTEMY PRI DVOINOM VRASHCHENII]**

O. A. VOROB'EV *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Mar.-Apr. 1984, p. 259-265. In Russian. refs

Features of the combined stimulation of the otoliths and semicircular canals during simultaneous rotations in two intersecting planes are studied from the point of view of illusory sensations of motion. It is shown that this vestibulosensory reflex is a result of the influence of a rotary moment, which is formed by the action of a pair of gyroscopic forces on the otoliths and angular accelerations on the semicircular canals, and which is applied to the vestibular receptors. An analysis of the adequate stimuli of the cupular receptors demonstrated that, in biplane rotation, all the canals of the labyrinth are stimulated, not just those in the plane of the illusory motion. It is proposed that, in this case, the vestibular apparatus functions as a gyroscopic system, at least in relation to the formation of vestibulosensory reactions. J.N.

A84-31501

**QUANTITATIVE STUDY OF MYOGLOBIN IN PATIENTS WITH ACUTE RENAL INSUFFICIENCY IN THE CASE OF SKELETAL-MUSCLE DAMAGE [KOLICHESTVENNOE ISSLEDOVANIE MIOGLOBINA U BOL'NYKH S OSTROI POCHECHNOI NEDOSTATOCHNOST'IU PRI POVREZHDENII AKH SKELETNYKH MYSHTS]**

I. I. SHIMANKO and A. P. MILASHENKO *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Sept. 1983, p. 20-24. In Russian. refs

A84-31503

**STUDY OF THE STATE OF THE ACCOMMODATIVE CONVERGENCE/ACCOMMODATION RATIO IN HEALTHY PERSONS [IZUCHENIE SOSTOIANIIA OTNOSHENIIA AKKOMODATIVNAIA KONVERGENTSIIA/AKKOMODATSIIA U ZDOROVYKH LITS]**

N. M. DEGTIAREVA (Srebnianskaia Tsentral'naia Raionnaia Bol'nitsa, Ukrainian SSR) Oftal'mologicheskii Zhurnal (ISSN 0030-0675), vol. 38, no. 5, 1983, p. 286-288. In Russian. refs

A84-31504

**ACID-BASE STATE OF THE BLOOD DURING THE TRAINING OF ATHLETES AT A HEIGHT OF ABOUT 1500 M ABOVE SEA LEVEL [KISLOTNO-SHCHELOCHNOE SOSTOIANIE KROVI PRI TRENIROVKE SPORTSMENOV V SREDNEGOR'E]**

V. P. LOGVIN (Akademiia Nauk Belorusskoi SSR, Institut Fiziologii, Minsk, Belorussian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1983, p. 19, 20. In Russian. refs

A84-31505

**AGE AND SEX RELATED FEATURES OF HAND-BONE MINERALIZATION IN HUMANS [VOZRASNIE I POLOVYE OSOBENOSTI MINERALIZATSII KOSTEI KISTI CHELOVEKA]**  
M. A. KORNEV (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad, USSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 13-26. In Russian. refs

An investigation was made of the age-related dynamics of the mineral saturation of hand and foot bones during prepuberty and puberty, and sex-related differences among boys and girls with respect to bone mineralization were established. A precise quantitative evaluation of mineral-salt content in the bones studied in relation to age was carried out, and upper and lower bounds of normality in age groups from 10 to 18 years were determined. The suitability of X-ray densitometry for investigating fluctuations of bone mineral-salt content in relation to age is noted. B.J.

A84-31509

**THE ROLE OF THE FIXATOR MUSCLES OF THE HUMAN SHOULDER JOINT [O ROLI MYSHTS, UKREPLIAUSHCHIKH PLECHEVOI SUSTAV CHELOVEKA]**

V. G. VAINSHTEIN (Leningradskii Nauchno-Issledovatel'skii Institut Travmatologii i Ortopedii, Leningrad, USSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 79-81. In Russian. refs

A84-31515

**PATHOMORPHOLOGY OF HUMAN NASAL MUCOSA IN MOUNTAIN CONDITIONS [PATOMORFOLOGIIA SLIZISTOI OBOLOCHKI NOSA CHELOVEKA V USLOVIYAKH VYSOKOGOR'A]**

A. S. ROSTOVSHCHIKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 45, no. 9, 1983, p. 23-30. In Russian. refs

Transmission and scanning electron microscopy studies of human nasal mucosa in mountain conditions (3375 m above sea level) were performed. After two weeks of stay at this altitude, disadaptive changes of the mucosa were found to occur, including edema, leucocyte infiltration, and destructive changes and focal desquamation of tegmental epithelium cells. Within one month these disadaptive changes become a chronic process accompanied by metaplasia of respiratory epithelium into multilayer squamous epithelium. B.J.

A84-31516

**THE EFFECT OF ETHYMSOLE ON THE LATENT STATES OF SHORT-TERM VERBAL MEMORY IN PATIENTS SUFFERING FROM THE AFTEREFFECTS OF CEREBRAL CIRCULATION DISORDERS [VLIANIE ETIMIZOLA NA LATENTNYE SOSTOIANIIA KRATKOVREMENNOI VERBAL'NOI PAMIATI BOL'NYKH S POSLEDSTVIAMI NARUSHENII MOZGOVOGO KROVOOBRAZHENIIA]**

A. A. LEBEDEV, L. S. GAPEEVA, and A. V. CHALOV (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Sovetskaya Meditsina, no. 9, 1983, p. 53-56. In Russian. refs

A84-31517

**IRON, COPPER, AND MANGANESE METABOLISM IN WORKERS ENGAGED IN HEAVY PHYSICAL LABOR [OBMEN ZHELEZA, MEDI I MARGANTSIA V ORGANIZME RABOCHIKH PRI TIAZHELOM FIZICHESKOM TRUDE]**

V. V. NASOLODIN (Iaroslavskii Gosudarstvennyi Universitet, Yaroslavl, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Sept. 1983, p. 21-24. In Russian. refs

A study of 19 blacksmiths has shown that the iron levels are at a maximum in autumn and winter and at a minimum in spring and (especially) summer. Copper and manganese levels remained unchanged throughout the year. After workshifts, iron concentrations were significantly reduced, while copper levels in the plasma decreased and manganese content in the blood remained relatively stable. The daily balance of iron and manganese in winter and especially in summer was negative owing to an insufficient amount of these elements in food. B.J.

A84-31518

**THE FUNCTIONAL ACTIVITY OF THE HYPOTHALAMO-HYPOPHYSEO-ADRENAL AXIS IN WORKERS INVOLVED IN THE PRODUCTION OF ORGANIC GLASS AND POLYVINYL CHLORIDE [FUNKTSIONAL'NAIA AKTIVNOST' GIPOTALAMO-GIPOFIZARNO-NADPOCHECHNIKOVOI OSI U RABOCHIKH PROIZVODSTV ORGSTEKLA I POLIVINILKHLORIDA]**

I. A. MAKAROV (Institut Gigieny Truda i Profzabolevanii, Gorki, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Sept. 1983, p. 28-31. In Russian. refs

A84-31520

**STATE OF HEALTH, WORKING CONDITIONS, AND WORKLOAD RESPONSE AMONG WOMEN OF RETIREMENT AGE WORKING IN VEGETABLE FARMING [SOSTOIANIE ZDOROV'IA, USLOVIA TRUDA I REAKTSII NA PROIZVODSTVENNYE NAGRUZKI ZHENSCHIN PENSIONNOGO VOZRASTA V OVOSHCHEVODSTVE]**

L. I. POPLAVSKAIA, R. Z. MOROZOVA, S. A. LATANIUK, and V. I. SAVARENIUK (Dnepropetrovskii Nauchno-Issledovatel'skii Institut Vosstanovleniia i Ekspertizy Trudospособnosti Invalidov, Vinnitsa, Ukrainian SSR) Gigiena Truda i Professional'nye Zabolevaniia, Sept. 1983, p. 40, 41. In Russian.

A84-31521

**FEATURES CHARACTERIZING THE FUNCTIONING OF THE FEMALE ORGANISM WITH AN ALLOWANCE MADE FOR CERTAIN INDICATORS OF NONSPECIFIC IMMUNOLOGICAL REACTIVITY AMONG WOMEN AT A SHIPYARD [OSOBENOSTI FUNKTSII ZHENSKOGO ORGANIZMA S UCHETOM NEKOTORYKH POKAZATELEI NESPETSIFICHESKOI IMMUNOLOGICHESKOI REAKTIVNOSTI U RABOTNITS SUDOREMONTNOGO ZAVODA]**

D. M. BABOV and E. F. KOVSHAR (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) Gigiena Truda i Professional'nye Zabolevaniia, Sept. 1983, p. 41-43. In Russian.

**A84-31602\*** Management and Technical Services Co., Houston, Tex.

# **QUANTITATION OF TISSUE LOSS DURING PROLONGED SPACE FLIGHT**

J. I. LEONARD (GE Management and Technical Services Co., Houston, TX), C. S. LEACH (NASA, Johnson Space Center, Biomedical Laboratories, Houston, TX), and P. C. RAMBAUT (NASA, Washington, DC) American Journal of Clinical Nutrition (ISSN 0002-9165), vol. 38, Nov. 1983, p. 667-679. refs (Contract NAS9-14523; NAS9-15487; NAS9-16328)

An analysis of data from the three Skylab missions was performed to assess the lean body mass (LBM) and fat components of inflight body weight loss. Six methods for determining LBM were employed based on changes in total body water, total body potassium, nitrogen balance, potassium balance, and stereophotometric-body density. Those based solely on body potassium, and potassium and nitrogen balances (when expressed as shifts from preflight control), consistently overestimated LBM loss unless appropriate corrections were made. The average results from the various methods indicated that of a mean inflight total body weight loss of  $2.7 \pm 0.3$  kg (SD) for all nine crewmembers, more than half ( $1.5 \pm 0.3$  kg) can be attributed to loss of LBM (including 1.1 kg body water), the remainder ( $1.2 \pm 0.3$  kg) being derived from fat stores. The reduction of LBM appeared to be complete after the first month of flight and thereafter was largely independent of mission duration, diet, and exercise.

Author

## **A84-32358**

### **CLINICAL-MORPHOLOGICAL CHARACTERIZATION OF THE ADITUS BLOCK IN THE CASE OF CHRONIC SUPPURATIVE OTITIS MEDIA [KLINIKO-MORFOLOGICHESKAIA KHARAKTERISTIKA BLOKA ADITUSA PRI KHRONICHESKOM GNOINOM SREDNEM OTITE]**

O. K. PATIAKINA, A. N. KHRABRIKOV, and V. P. BYKOVA (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 9-13. In Russian. refs

## **A84-32359**

### **THE POSSIBILITY OF USING TYMPANOMETRY IN THE CASE OF NONPERFORATED MEDIAL OTITIS [VOZMOZHNOСТИ TIMPANOMETRII PRI NEPERFORATIVNOM SREDNEM OTITE]**

V. T. DOLGIKH and I. B. RIMAN (I Moskovskii Meditsinskii Institut, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 13-18. In Russian. refs

## **A84-32360**

### **OTONEUROLOGICAL SYMPTOMS IN THE DIAGNOSIS OF DISEASES OF THE INNER EAR [OTONEVROLOGICHESKAIA SIMPTOMATIKA V DIAGNOSTIKE ZABOLEVANIИ VNUITRENNEGO UKHA]**

E. I. PETROVA (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 18-23. In Russian. refs

## **A84-32361**

### **THE DIAGNOSTIC VALUE OF THE GLYCEROL TEST IN THE CASE OF MENIERE'S SYNDROME [O DIAGNOSTICHESKOM ZNACHENII GLITSEROLOVOGO, TESTA PRI BOLEZNI MEN'ERA]**

M. P. NIKOLAEV, O. I. SIMBIRTSEVA, and A. S. SHEREMET (Ministerstov Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 23-29. In Russian. refs

Auditory and vestibular functions before and after a glycerol test in 72 patients suffering from Meniere's syndrome are investigated. The results are compared with the results obtained from an investigation of the lateralization of ultrasound and high tones. It is found that on the basis of data from tonal audiometry, the glycerol test is positive in 72.5 percent of the cases; with

data from speech audiometry, it is positive in 86.2 percent of the cases. In 85 percent of the cases, the vestibular function is greatly depressed in comparison with the initial state. In 73.6 percent of the cases, the glycerol test is followed by extreme headache. It is noted that in the study of the lateralization of ultrasound and high-frequency tones, it was found that ultrasound in 98.6 percent of the cases and high tones in 90 percent of the cases were directed toward the damaged ear. This is seen as particularly informative in diagnosing endolymphatic hydrops. C.R.

## **A84-32362**

### **EQUILIBRIUM IN PERSONS OF VARIOUS AGES ON THE BASIS OF DATA FROM STABILOGRAPHY [SOSTOIANIE FUNKTSII RAVNOVESIIA U LIUDEI RAZLICHNOGO VOZRASTA PO DANNYM STABILOGRAFIИ]**

L. A. LUCHIKHIN and A. F. PATRIN (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 29-34. In Russian. refs

The technique of stabilography is used to study equilibrium in 186 healthy persons ranging in age from 12 to 92. Changes induced by age are observed in all the indicators of the stabilogram, the changes being most pronounced in persons over 60. Changes with age are observed in the fixation index and in the ratio of the stabilogram indicators when the stabilogram is recorded in the frontal and sagittal planes. Also found are differences, again with age, in the stabilographic curve when it is evaluated visually. Rotational motion, combined with stabilography, confirms that the change in kinetic equilibrium is greater than that in static equilibrium. C.R.

## **A84-32363**

### **SENSITIVITY OF CREATINE PHOSPHOKINASE IN THE EARLY DIAGNOSIS OF MYOCARDIAL INFARCTION, AND THE IMPROVEMENT OF THE TEST'S SPECIFICITY BY DETERMINING THE RATE OF INCREASE OF ENZYME ACTIVITY [CHUVSTVITEL'NOST' KREATINFOSFOKINAZY V RANNEI DIAGNOSTIKE INFARKTA MIOKARDA I POVYSHENIE SPETSIFICHNOSTI TESTA PUTEM OPREDELENIИ SKOROSTI PRIROSTA AKTIVNOSTI FERMENTA]**

D. B. SAPRYGIN, V. M. ZHIVODEROV, N. A. AFONSKAIA, Z. V. CHERNIAVSKAIA, and O. A. AVILOVA (Akademiia Meditsinskikh Nauk SSSR; Ministerstvo Zdravookhraneniia RSFSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Sept. 1983, p. 41-46. In Russian. refs

## **A84-32364**

### **THE STATE OF THE BLOOD KALLIKREINKININ SYSTEM IN PATIENTS HAVING EXPERIENCED MYOCARDIAL INFARCTION, AND ITS RESPONSE TO PHYSICAL STRESS [SOSTOIANIE KALLIKREIN-KININOVOI SISTEMY KROVI U BOL'NYKH, PERENESSHIKH INFARKT MIOKARDA, I EE REAKTSIIA NA FIZICHESKUIU NAGRUZKU]**

F. I. AZIMOVA, A. A. NEKRASOVA, N. A. CHERNOVA, and L. F. NIKOLAEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Sept. 1983, p. 54-58. In Russian. refs

## **A84-32365**

### **CLINICAL ASSESSMENT OF TWO NEW METHODS FOR THE NONINVASIVE IDENTIFICATION OF CORONARY INSUFFICIENCY [KLINICHESKAIA OTSENKA DVUKH NOVYKH SPOSOBOV NEINVAZIVNOGO VYIAVLENIИ KORONARNOI NEDOSTATOCHNOSTI]**

A. V. VINOGRADOV, V. I. LOBZEVA, and T. A. TIMOFEEVA (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Sept. 1983, p. 65-69. In Russian. refs

Results of bicycle ergometry tests on normal subjects and anginal patients (males with normal blood pressure and body weight) indicate that a one-dimensional hyperplane exists which distinguishes between patients with coronary insufficiency and normal subjects. Test results were assessed with respect to changes in the electrocardiographic repolarization complex,

changes in the R-wave amplitude, Robinson's index, and the index of myocardial adaptation to exercise. All tests showed similar specificity. The superior sensitivity of the myocardial adaptation index to physical loads is associated with its connection to the contractile function of the myocardial ischemia. The hyperplane was determined from a distribution of the test subjects according to values of the myocardial adaptation index. J.N.

#### A84-32366

**THE CONDITION OF CENTRAL HEMODYNAMICS IN THE CASE OF THE LONG-TERM PHYSICAL EXERCISE OF PATIENTS HAVING EXPERIENCED MYOCARDIAL INFARCTION [SOSTOIANIE TSENTRAL'NOI GEMODINAMIKI PRI DLITEL'NYKH FIZICHESKIKH TRENIROVKAKH BOL'NYKH, PERENESSHIKH INFARKT MIOKARDA]**

L. F. NIKOLAEVA and S. S. MARKARIAN (Akademii Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Sept. 1983, p. 69-72. In Russian. refs

#### A84-32368

**A COMPARATIVE STUDY OF THE MAGNITUDE OF HEMODYNAMIC SHIFTS IN A TEST INVOLVING PHYSICAL LOADS WHEN THE TEST IS REPEATED [SRVITEL'NOE IZUCHENIE VYRAZHENOSTI GEMODINAMICHESKIKH SDVIGOV PRI PROVEDENII POVTORNYKH PROB S NAGRUZKOI]**

G. A. GLEZER and D. G. VINOGRADOV (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniyam Khimicheskikh Soedinenii, Kupavna, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Sept. 1983, p. 103-105. In Russian.

The effect of a preliminary reaction and of other factors arising from a first test on the magnitude of changes observed in the most frequently determined hemodynamic indicators in tests involving physical loads is investigated. The goal is to ascertain whether the shifts are as pronounced when the test is repeated. Forty men and women ranging in age from 15 to 35 are subjected to physical loads on a bicycle ergometer. EKG readings and readings of blood pressure and heart rate are taken. The shifts are found to be less pronounced when the test is repeated one day later. C.R.

#### A84-32370

**FACTORS OF NUTRITION AND STRESS IN THE DEVELOPMENT OF OBESITY (HYGIENIC ASPECTS) [FAKTORY PITANIA I STRESSA V RAZVITII OZHIRENIIA /GIGIENICHESKIE ASPEKTY/]**

V. IA. BEREZA (Ministerstvo Zdravookhraneniia Ukrainkoi SSR, Nauchno-Issledovatel'skii Institut Gигиены Pitaniia, Kiev, Ukrainian SSR) Voprosy Pitaniia (ISSN 0042-8833), Sept.-Oct. 1983, p. 9-13. In Russian. refs

#### A84-32371

**IRON, COPPER, AND MANGANESE METABOLISM IN YOUNG ATHLETES ON A DIET SUPPLEMENTED WITH VITAMINS AND TRACE ELEMENTS [OBMEN ZHELEZA, MEDI I MARGANZA V ORGANIZME IUNYKH SPORTSMENOV PRI VITAMINNYKH I MIKROELEMENTNYKH DOBAVKAKH K RATSIONAM PITANIA]**

V. V. NASOLODIN (Iaroslavskii Gosudarstvennyi Universitet; Iaroslavskii Gosudarstvennyi Pedagogicheskii Institut, Yaroslavl, USSR), V. IA. RUSIN, and I. P. GLADKIKH Voprosy Pitaniia (ISSN 0042-8833), Sept.-Oct. 1983, p. 16-21. In Russian. refs

#### A84-32376

**CERTAIN PATHOGENIC MECHANISMS OF ISCHEMIC STROKE DURING HEART-RHYTHM DISORDERS [NEKOTORYE PATOGENETICHESKIE MEKHANIZMY ISHEMICHESKOGO INSUL'TA PRI NARUSHENIIAKH SERDECHNOGO RITMA]**

R. A. ARISTOVA and N. V. KAZANTSEVA (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 83, no. 9, 1983, p. 1286-1291. In Russian. refs

#### A84-32377

**DOPPLER ULTRASONOGRAPHY IN DIAGNOSING THE SUBCLAVIAN STEAL SYNDROME [UL'TRAZVUKOVAIA DOPPLEROGRAFIYA V DIAGNOSTIKE SINDROMA PODKLIUCHICHNOGO OBKRADYVANIYA]**

IU. M. NIKITIN (Akademii Meditsinskikh Nauk SSSR, Moscow, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 83, no. 9, 1983, p. 1295-1299. In Russian. refs

#### A84-32378

**COMPLEX SCANNING ULTRASONOGRAPHY, DOPPLER SONOGRAPHY, TELETERMOMOGRAPHY, AND INFRARED RADIOMETRY IN STUDIES OF CIRCULATION THROUGH THE CAROTID ARTERIES [SLOZHNOE UL'TRAZVUKOVOE SKANIROVANIE, DOPPLEROSONOGRAMIYA, TELETERMOMOGRAFIYA INFRAKRASNAIA RADIOMETRIYA PRI ISSLEDOVANII KROVOOBRASHCHENIIA PO SONNYM ARTERIIAM]**

V. A. KARLOV, I. D. STULIN, IU. N. BOGIN, I. A. SKORUNSKII, A. N. SELEZNEV, A. A. CHEVNENKO, and A. V. KOSTIN Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 83, no. 9, 1983, p. 1307-1314. In Russian. refs

#### A84-32379

**CHANGES IN THE POSTURAL BALANCE OF PATIENTS WITH CEREBRAL CIRCULATION DISORDERS [IZMENENIIA POSTURAL'NOGO RAVNOVESIIA U BOL'NYKH S NARUSHENIEM MOZGOVOGO KROVOOBRASHCHENIIA]**

E. B. LIUBCHINSKII (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 83, no. 9, 1983, p. 1315-1318. In Russian. refs

#### A84-32380

**ASYMMETRIC PULSATION IN THE SUPRACLAVICULAR PART OF THE NECK IN HEALTHY PERSONS IN THE SUPINE POSITION: A PHYSIOLOGICAL OR A PATHOLOGICAL PHENOMENON? (A CLINICAL-ULTRASOMOGRAPHIC STUDY) [ASIMMETRICHNAIA PUL'SATSIYA V NADKLIUCHICHNOI OBLASTI SHEI U PRAKTICHESKI ZDOROVYKH LIUDEI, NAKHODIASHCHIKHSIA V GORIZONTAL'NOM POLOZHENII, - FIZIOLOGICHESKII ILI PATOLOGICHESKII FENOMEN? /KLINIKO-UL'TRAZVUKOVOE ISSLEDOVANIE/]**

I. D. STULIN, V. A. KARLOV, and I. A. SKORUNSKII (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 83, no. 9, 1983, p. 1326-1329. In Russian. refs

#### A84-32385

**THE USE OF A VARIABLE MAGNETIC FIELD FOR TREATING EDEMATOUS EXOPHTHALMOS [OPYT PRIMENENIIA PEREMENNOGO MAGNITNOGO POLIA V LECHENII BOL'NYKH OTECHNYM EKZOFTAL'MOM]**

E. S. VAINSHTEIN, L. V. ZOBINA, G. V. KRUSHKOVA, and G. A. MEZENTSEVA (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), Sept.-Oct. 1983, p. 63-65. In Russian. refs

#### A84-32386

**NEW METHOD FOR AN OBJECTIVE EVALUATION OF THE CONDITION OF COLOR VISION (PRELIMINARY RESULTS) [NOVYI SPOSOB OB'EKTIVNOI OTSENKI SOSTOIANIIA TSVETOVOGO ZRENIYA /PREDVARITEL'NYE REZULTATY/]**

O. I. SHCHERBATOVA, A. A. KABAN, S. L. SOKOV, A. I. BOGOSLOVSKII, and S. O. VASKOV (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), Sept.-Oct. 1983, p. 68-70. In Russian. refs

Retinograms recorded in response to red and green stimuli of duration 2 microseconds and of angular dimension 10 deg are used to correlate retinal biopotential amplitudes. Two responses were recorded for the norm in which the ratio of the amplitudes



of the b and -b waves for the red and green stimuli approached unity (from 0.7 to 1.4). The difference between the obtained correlations in subjects with normal color vision and those with deuteranomaly and protanomaly served as the basis for an objective method to identify deviations in color perception. J.N.

## A84-32389

**THE THERAPEUTIC USE OF DECIMETER WAVES DURING VARIOUS PERIODS FOLLOWING A CEREBRAL STROKE [LECHEBNOE PRIMENENIE DETSIMETROVYKH VOLN V RAZNYE SROKI POSLE PERENESENNOGO MOZGOVOGO INSULTA]**

D. P. DANILOVA and V. M. ANDREEVA (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Voprosy Kurortologii i Fizioterapii i Lechebnoi Fizicheskoi Kul'tury (ISSN 0042-8787), Sept.-Oct. 1983, p. 26-28. In Russian.

## A84-32391

**THE RELEVANCE OF THE PHYSICAL PARAMETERS OF THE DECIMETER ELECTROMAGNETIC WAVES AND OF THE ELECTRICAL PROPERTIES OF THE TISSUES TO THE THERAPEUTIC EFFECT [ZNACHENIE FIZICHESKIKH PARAMETROV ELEKTROMAGNITNYKH VOLN DETSIMETROVOGO DIAPAZONA I ELEKTRICHESKIKH SVOISTV TRANEI DLIA LEHEBNOGO EFFEKTA]**

A. N. OBROSOV and L. A. SKURIKHINA (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Voprosy Kurortologii i Fizioterapii i Lechebnoi Fizicheskoi Kul'tury (ISSN 0042-8787), Sept.-Oct. 1983, p. 61-63. In Russian.

## A84-32393

**PHENOMENON OF DIRECTIONAL PREPONDERANCE OF VESTIBULAR NYSTAGMUS [O FENOMENE PREOBLADANIYA VESTIBULIARNOGO NISTAGMA /PVN/]**

I. A. SKLIUT, V. I. PIVRIKAS, and S. G. TSEMAKHOV (Belorusskii Nauchno-Issledovatel'skii Institut Nevrologii, Neirokhirurgii i Fizioterapii, Minsk, Belorussian SSR; Kaunaskii Meditsinskii Institut, Klaipeda, Lithuanian SSR) Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei (ISSN 0044-4650), Sept.-Oct. 1983, p. 1-7. In Russian. refs

An analysis of vestibulometric data from various patients with supratentorial brain tumors, with brain infarction in the carotid system region, with brain stem infarction, or with Meniere's disease determines the topodiagnostic importance of the directional preponderance (DP) phenomenon and its role in assessing the functional state of the vestibular system. It is concluded from the results of caloric tests on patients with asymmetric vestibular reflexes that the DP phenomenon is a dynamic indicator of the degree of compensation of the vestibular function and may appear at any level of vestibular system affection from the cortex to the receptor structures of the labyrinth. J.N.

## A84-32395

**A CLINICAL EVALUATION OF THE CONDITION OF THE MYOCARDIUM DURING ARTIFICIAL HYPERTHERMIA [KLINICHESKAIA OTSENKA FUNKTSIONAL'NOGO SOSTOYANIYA MIKARDA PRI ISKUSSTVENNOI GIPERTERMII]**

V. I. SOBOLEVSKII (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) Kazanskii Meditsinskii Zhurnal, vol. 44, Sept.-Oct. 1983, p. 345-347. In Russian. refs

It is found from a study of 104 healthy men that serious irregularities in heart activity can be induced by brief artificial hyperthermia. These irregularities include atrioventricular block, extrasystole, degradation of the indicators of the contractile function, and migration of the rhythm driver. An increased level of monitoring is recommended when hyperthermia is used for preventive or therapeutic purposes. It is also recommended that persons whose occupations subject them to thermal stresses be examined and screened. C.R.

## A84-32396

**THE EFFECT OF SODIUM FLUORIDE ON THE VESTIBULAR FUNCTION OF PATIENTS SUFFERING FROM OTOSCLEROSIS [VLIANIE FLORISTOGO NATRIIA NA VESTIBULIARNUIU FUNKTSIU U BOL'NYKH OTOSKLEROZOM]**

L. G. SVATKO, I. M. BUDNIK, and A. IA. NUGUMANOV (Kazanskii Meditsinskii Institut, Kazan, USSR) Kazanskii Meditsinskii Zhurnal, vol. 44, Sept.-Oct. 1983, p. 367-369. In Russian.

## A84-32562

**THE SICKLE CELL TRAIT IN RELATION TO THE TRAINING AND ASSIGNMENT OF DUTIES IN THE ARMED FORCES. III - HYPOSTHENURIA, HEMATURIA, SUDDEN DEATH, RHABDOMYOLYSIS, AND ACUTE TUBULAR NECROSIS**

L. W. DIGGS Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 358-364. refs

## A84-32563

**HYPHYDRATION AND ACCLIMATION - EFFECTS ON HORMONE RESPONSES TO EXERCISE/HEAT STRESS**

R. P. FRANCESCONI, M. N. SAWKA, and K. B. PANDOLF (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 365-369. refs

The effects of heat acclimation on the magnitude of plasma cortisol (PC) and growth hormone (GH) responses during exercise in a hot-wet (35 C, 79 percent rh) or hot-dry (49 C, 20 percent rh) environment were studied in eight males and eight females. The effects of hypohydration (-5 percent body weight) on heat/exercise-induced responses were also documented. No differences in response patterns were observed between male and female subjects. Preacclimation, hypohydration in hot-wet and hot-dry environments increased PC levels during the fourth exercise level. Acclimation did not influence PC levels in the euhydrated condition. In the hot-wet environment, PC levels decreased during hypohydration. Preacclimation exercise in either environment produced higher GH concentrations during euhydration. It is concluded that hypohydration to -5 percent of body weight generally effected higher levels of circulating stress hormones, and that acclimation did not effect consistent decrements in these responses. C.M.

## A84-32567

**SUBJECTIVE EFFECTS OF COMBINED-AXIS VIBRATION - COMPARISON OF Y-AXIS AND Y-PLUS-ROLL VIBRATIONS**

R. W. SHOENBERGER (USAF, Aerospace Medical Research Laboratory Wright-Patterson AFB, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 387-390. refs  
(Contract F33615-79-C-0509)

Thirteen male Air Force military personnel were tested on a six-degree-of-freedom motion device to examine the subjects' perception of the intensity of single-axis stimulus vibrations in the Y-axis, or combined-axis stimulus vibrations composed of Y-axis and roll motions. Stimulus vibrations were sinusoidal at 3.15, 4, 5, 6.3, and 8 Hz. It was shown that sensitivity to Y-axis and roll vibration decreased as frequency increased, and that the subject's perception of vibration intensity was influenced by the magnitude of the translational component produced by an angular vibration. Also demonstrated was that there were only minor differences in the perceptions of pure Y-axis vibrations, and equivalent Y-axis acceleration in combination with 3.5 rad/s sq RMS of roll. It was concluded that the effects of a given angular vibration in the roll axis could be accounted for by the translational component produced at the subject's seat. C.M.



A84-32568

**FACTITIOUS DECOMPRESSION SICKNESS**

B. P. MURPHY (USAF, School of Aerospace Medicine, Brooks AFB, TX), J. C. DAVIS (Hyperbaric Medicine Associates, San Antonio, TX), and D. L. HENDERSON (Defence and Civil Institute of Environmental Medicine, Toronto, Canada) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 396, 397. refs

The diagnosis of decompression sickness is made largely by history; there are few physical findings and no radiographic or laboratory tests to support the diagnosis. Three cases of factitious decompression sickness in which patients fabricated an appropriate history and underwent compression therapy are presented. Due to the potential severity of decompression sickness and the relative safety of compression therapy, the initiation of therapy must not be delayed in a case of decompression sickness. Once therapy is begun, investigation into the particulars of a suspicious case can be made. Author

A84-32569

**THE INTERNATIONAL STANDARDIZATION OF THE MEDICAL CERTIFICATION OF CIVIL AIRCREW**

W. R. CLARKE (USAF, Hospital, Grand Forks AFB, ND) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 398-402. refs

The process of developing international standards for the medical certification of civil aircrew is analyzed, taking the problems of ethnocentrism into account. Consideration is given to the International Civil Aviation Organization, and the Annex 1 to the Convention on International Civil Aviation. Enforcement and the consequent counterproductive results (e.g., a political reprisal to the denial of air space access) are also examined. It is concluded that enforcement of pilot certification should be a minor element of a state's foreign policy, and that consensus building in the context of peacetime diplomacy is the optimum method for establishing international standards. C.M.

A84-32571

**MILD HYPOXIA AND THE USE OF OXYGEN IN FLIGHT**

J. ERNSTING (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 407-410. refs

Hypoxia in aviation remains a major hazard. It may be caused by ascent while breathing air, failure of oxygen supply or loss of cabin pressurisation. Malfunction of equipment or its improper use accounted for the majority of hypoxic incidents in one 10-year military study. Symptoms of hypoxia depend on rate of ascent, temperature, and individual variation, as well as altitude. Dyspnoea, lack of coordination and reduction in capacity for skilled performance precede the gross changes which occur at altitudes of over 4572 m (15,000 ft) and lead ultimately to unconsciousness. Studies have shown a significant decrease in psychomotor task ability at altitudes as low as 2438 m (8000 ft). Developments in aircraft oxygen systems are discussed and the importance of adequate crew instruction on hypoxia and their aircraft oxygen equipment is stressed. Author

A84-32572

**HYPERVENTILATION IN FLIGHT**

T. M. GIBSON (RAF, Pewsey, Wilts., England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 411, 412.

Hyperventilation in flight may be caused by environmental, psychological, pharmacological, and pathological factors. The effects are discussed and two case histories are presented, illustrating the development and effect of hyperventilation in training or aircrew under stress. Investigation of in-flight hyperventilation is technically very difficult, but positive acceleration, hypoglycaemia, and anxiety are important contributory factors. The incidence of hyperventilation must be reduced by educating aircrew in its aetiology, early recognition, and treatment. Author

A84-32573

**SMALL AIRWAYS, LUNG FUNCTION AND AVIATION**

M. GREEN (Brompton Hospital, London, England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 415-418. refs

The anatomy, physiology, and functional assessment of small airways in the lung, and their importance in aviation are discussed. Widespread damage of the small airways can occur before detection by lung function tests, and minor respiratory function abnormalities, inconsequential at sea level, can reduce arterial oxygen saturation at high altitude. Pulmonary disease can also detrimentally affect in-flight crew performance. It is recommended that peak flow, forced expiratory volume in one second, and forced vital capacity be measured in civilian air crew before employment and routinely thereafter. C.M.

A84-32574

**THE NATURAL HISTORY OF ASTHMA - AEROMEDICAL IMPLICATIONS**

J. A. C. HOPKIRK (King Edward VII Hospital, Midhurst, Sussex, England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 419-421. refs

Asthma is often incompatible with flying and it is important that the natural history of the disorder is understood in relation to both pretraining enrollment and inservice fitness checks. Studies of childhood asthma with prolonged follow-up have shown that as many as 70 percent experience some asthmatic symptoms in later life. Of asymptomatic adults with a history of childhood asthma, 60 percent have evidence of bronchial lability and therefore an ongoing asthmatic tendency. Asthma developing in adulthood may be intermittent or continuous, with a poorer prognosis. A history of childhood asthma should be disqualifying for entry into pilot training. If asthma develops after training, persistent asthma, intermittent asthma with frequent or severe attacks, and asthma requiring regular beta-agonist, theophylline or corticosteroid inhaler treatment should all preclude aircrew from further flying. Author

A84-32575

**NASAL DISEASE IN RELATION TO FITNESS OF A PILOT**

B. H. PICKARD (St. George's Hospital, London, England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 429, 430.

A84-33061

**FEATURES CHARACTERIZING THE RESPONSES TO PHYSICAL LOADS OF PATIENTS SUFFERING FROM CHRONIC PNEUMONIA WITH RESPIRATORY INSUFFICIENCY [OSOBENOSTI REAKTSII NA FIZICHESKUIU NAGRUZKU U BOL'NYKH KHRONICHESKOI PNEVMONIEI S DYKHATEL'NOI NEDOSTATOCHNOST'IU]**

E. I. SOKOLOV and S. N. MEDVEDEV (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Sovetskaya Meditsina, no. 10, 1983, p. 25-29. In Russian.

A84-33062

**THE VALUE OF AMBULATORY ELECTROCARDIOGRAPHIC MONITORING IN CASES OF ISCHEMIC HEART DISORDERS [ZNACHENIE AMBULATORNOGO ELEKTROKARDIOGRAFIKESKOGO MONITORNOGO NABLIUDENIIA PRI ISHEMICHESKOI BOLEZNI SERDTSA]**

E. V. GEMBITSKII (Tsentr'al'nyi Institut Usovershenstvovaniia Vrachey, Moscow, USSR) and I. N. KARNAUKHOV (Tsentr'al'nyi Voennyi Klinicheskii Gosptal', Moscow, USSR) Sovetskaya Meditsina, no. 10, 1983, p. 72-75. In Russian. refs

A84-33063

**CERTAIN FEATURES IN DIAGNOSING AND TREATING CARDIAC ARRHYTHMIA UNDER CONDITIONS OF A PROLONGED MONITORING OF HEART RHYTHMS [NEKOTORYE OSOBENNOSTI DIAGNOSTIKI I LECHENIIA ARITMII SERD TSA V USLOVIYAKH DLITEL'NOGO MONITORIROVANIYA SERDECHNOGO RITMA]**

V. G. KUKES and E. A. SYRKINA (I Moskovskii Meditsinskii Institut, Moscow, USSR) Sovetskaya Meditsina, no. 10, 1983, p. 79-82. In Russian. refs

A84-33064

**THE NEUROLOGICAL MANIFESTATIONS OF LUMBAR OSTEOCHONDROSIS IN RELATION TO DATA FROM COMPUTER TOMOGRAPHY [K VOPROSU O NEVROLOGICHESKIKH PROIYAVLENIYAKH POIASNICHNOGO OSTEOKHONDROZA V SOPOSTAVLENII S DANNYMI KOMP'YUTERNOI TOMOGRAFI]**

N. N. OKHRIMENKO, P. A. KOVALENKO, V. K. ZHILTSOV, and I. F. BUDAGIAN Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Oct. 1983, p. 25-29.

A84-33151\* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**PRESSURE DIFFERENCE-FLOW RATE VARIATION IN A FEMORAL ARTERY BRANCH CASTING OF MAN FOR STEADY FLOW**

Y. I. CHO, L. H. BACK (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), and D. W. CRAWFORD (Southern California, University, Los Angeles, CA) ASME, Transactions, Journal of Biomechanical Engineering, vol. 105, Aug. 1983, p. 258-262. NASA-sponsored research. refs (Contract NIH-HL-23619-03)

In-vitro, steady flow in a casting of the profunda femoris branch of the femoral artery of man was studied by measuring pressure differences in the main lumen and also in the branch over a large Reynolds number range from 200 to 1600. Effects of viscous and inviscid flows in this femoral artery branch were demonstrated quantitatively. The critical ratio of the flow rate in the branch to the upstream main lumen in this casting was found to be 0.4, above which the inviscid flow analysis indicated a pressure rise and below which it yielded a pressure drop in the main lumen across the branch junction. Pressure rises were experimentally found to occur both in the main lumen and in the branch for certain ranges of the aforementioned ratio. Author

N84-23095\* National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

**METHOD OF MAKING AN ION BEAM SPUTTER-ETCHED VENTRICULAR CATHETER FOR HYDROCEPHALUS SHUNT Patent**

B. A. BANKS, inventor (to NASA) 21 Feb. 1984 8 p Filed 24 Nov. 1982 Division of Serial No. 272407, filed 10 Jun. 1981, Patent No. 4,377,169

(NASA-CASE-LEW-13107-2; US-PATENT-4,432,853; US-PATENT-APPL-SN-444124; US-PATENT-CLASS-204-192E; US-PATENT-CLASS-156-643; US-PATENT-CLASS-156-644; US-PATENT-CLASS-156-668) Avail: US Patent and Trademark Office CSCL 06B

The centricular catheter comprises a multiplicity of inlet microtubules. Each microtubule has both a large opening at its inlet end and a multiplicity of microscopic openings along its lateral surfaces. The microtubules are perforated by an ion beam sputter etch technique. The holes are etched in each microtubule by directing an ion beam through an electro formed mesh mask producing perforations having diameters ranging from about 14 microns to about 150 microns. This structure assures a reliable means for shunting cerebrospinal fluid from the cerebral ventricles to selected areas of the body.

Official Gazette of the U.S. Patent and Trademark Office

N84-23096 British Aerospace Dynamics Group, Bristol (England). Human Factors and Vision Research Dept.

**SOME COMPARISONS BETWEEN NVL AND ORACLE-BASED MRTD APPROACHES**

I. OVERINGTON 20 Jan. 1981 8 p refs (BAE-BT-11240) Avail: Issuing Activity

Severe limitations of MRTD visual modeling for overall assessment of thermal imager systems in practical acquisition tasks are discussed. Desire to retain the MRTD concept for routine system comparison arises from its simplicity and because many laboratories are geared up to carry out practical MRTD measurement, despite its defects in no-search, foveal interrogation tasks. The relative flexibility of the NVL-based and ORACLE-based computation of MRTD is considered. It is concluded that, where MRTD must be used, there are good reasons for using ORACLE-based predictions of MRTD rather than NVL-based computations. Author (ESA)

N84-23097# School of Aerospace Medicine, Brooks AFB, Tex. **YELLOW OPHTHALMIC FILTERS IN THE VISUAL ACQUISITION OF AIRCRAFT Final Report, Apr. - Jul. 1982**

W. F. PROVINCES, A. J. RAHE, M. G. BLOCK, T. PENA, and T. J. TREDICI Dec. 1983 17 p

(Contract AF PROJ. 7755)

(AD-A138536; USAFSAM-TR-83-46) Avail: NTIS HC A02/MF A01 CSCL 06P

Twenty subjects made a total of 400 threshold visual acquisitions of T-38 aircraft approaching from 9 miles out. Half of the acquisitions were made with the subjects wearing yellow ophthalmic filters, and the other half without filters. The researchers found no overall statistically significant difference in acquisition performance due to the use of yellow filters. Author (GRA)

N84-23098# Miami Univ., Fla. Dept. of Anesthesiology. **MODELING OF INHALATION ADMINISTRATION OF VAPORS WITH CAPACITY LIMITED CLEARANCE Final Scientific Report, 30 Jun. 1981 - 31 Aug. 1983**

V. THOMAS 31 Aug. 1983 100 p

(Contract AF-AFOSR-0210-81; AF PROJ. 2312)

(AD-A138847; AFOSR-84-0125TR) Avail: NTIS HC A05/MF A01 CSCL 06T

The overall objective of the project was to design economical and informative testing of subacute and chronic toxicity of new volatile substances. The specific objectives were: (1) to prepare a mathematical model for simulation of uptake, distribution, and elimination of vapors with capacity-limited clearance; (2) to obtain experimental data supporting the model; (3) to study the factors affecting nonlinearity of clearance (concentration dependence, interference of inhalation of other vapors). The main accomplishments are: (1) A program for mathematical solution of a multi-compartmental model for simulation of uptake, distribution, and elimination of vapors having a capacity limited elimination pathway was prepared for the Apple II Plus computer and tested by simulating a variety of trichloroethylene and halothane exposures. (2) Three methods for determination of metabolic clearance were tested: (a) systemic clearance was determined from the concentration differences in inhaled air and arterial blood; (b) intrinsic clearance in organs was determined from distribution of inhaled chemicals in the body during steady state; (c) intrinsic clearance by each metabolic pathway was determined from distribution and elimination of metabolites. (3) The retention of vapors of water soluble chemicals in trachea was determined and the significance of retention of chemicals in respiratory airways is discussed. GRA

**N84-23099#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Human Engineering Div.  
**THE EFFECT OF HAZE ON AN OPERATOR'S VISUAL FIELD AND HIS TARGET DETECTION PERFORMANCE**  
 W. N. KAMA, L. V. GENCO, M. A. H. BARBATO (Systems Research Labs., Inc., Dayton, Ohio), and M. D. HAUSMANN (Systems Research Labs., Inc., Dayton, Ohio) Nov. 1983 27 p  
 (Contract F33615-82-C-0511; AF PROJ. 7184)  
 (AD-A138330; AFAMRL-TR-83-066) Avail: NTIS HC A03/MF A01 CSCL 06P

A study was conducted to determine what type of relationship, if any, exists between the amount of haze emanating from a transparency and the percent of an operator's visual field that is 'lost'. The effect of this haze on his ability to perform a target detection task was also determined. Ten subjects performed a simple target detection task in which they were required to indicate when they could see a slowly moving, 1.0 minute of arc, 80% contrast target that traveled in 8 (0, 45, 90, 135, 180, 225, 270 or 314 degrees) different angular directions from the center of a background screen towards the periphery. The subjects performed this task while looking through haze test panels mounted at 90 deg, 63 deg or 45 deg to their line of sight and which when illuminated by a bright light source mounted at the center of the background screen resulted in haze conditions of 2%-3.5%, 5%-10%, 15%-26% or 25%-48%. A baseline condition in which no test panel was interposed between the subject, the task, and the bright light source was also administered. Subject performance was evaluated in terms of: (1) the distance the target had moved before being seen, and (2) the number of times that is was not detected. The results of this study indicated that as the percent of haze present in a transparency increased, the percent of an operator's background FOV that is occluded also increased but that the percent of targets detected decreased. GRA

**N84-23100#** Naval Health Research Center, San Diego, Calif.  
**COGNITIVE PERFORMANCE CHANGE DURING A 6-HOUR HIKE AT LOW TEMPERATURE IN SIMULATED RAIN, AT CONTROLLED WALKING RATES Final Report**  
 D. J. HORD and R. THOMPSON Dec. 1983 16 p  
 (Contract MR0-4101)  
 (AD-A138358; NAVHLTHRSCHC-83-32) Avail: NTIS HC A02/MF A01 CSCL 06S

Much evidence supports the idea that cognitive performance decrements associated with cold exposure are attributable to the discomfort experienced rather than to direct physiological effects. Data obtained under laboratory conditions have led to the 'distraction' hypothesis of cold-related cognitive performance changes. To test the effects of wet-cold exposure on cognitive performance in a field situation, thirty volunteers each completed a 6-hr hike in ambient temperatures ranging from -1.5 to 9.5 degrees C. Core temperature, skin temperature and oxygen consumption were monitored continuously. VO<sub>2</sub> max, body surface, mean skinfold, height and weight were obtained prior to the hike. Cognitive performance was measured at 1 hr intervals and included the Baddeley Reasoning, Coding, Number Comparison, and Tapping tests. The results indicate that core temperature changes do not correlate with any of the cognitive performance changes. Furthermore, skin temperature change did not correlate with cognitive performance change. The 'distraction' hypothesis was therefore not supported. Based on anecdotal information obtained while running subjects, it is hypothesized that cognitive performance changes in wet-cold are related to personality attributes associated with attention or coping ability. GRA

**N84-23101#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.  
**FACTORS AFFECTING HUMAN TOLERANCE TO SUSTAINED ACCELERATION Interim Report**  
 L. HREBIEN and E. HENDLER 30 Nov. 1983 51 p  
 (AD-A138520; NADC-84021-60) Avail: NTIS HC A04/MF A01 CSCL 06S

Six relaxed subjects were exposed on a centrifuge to increasing G pulses in order to determine their G tolerance. G protection

was provided by supination and/or inflation of anti-G suit (AGS) bladders using a newly developed rapid response, servo controlled anti-G (SCAG) valve. Supination, alone or with the AGS, was most effective in increasing G tolerance. Increases in SCAG Valve outlet pressure were directly related to increases in G tolerance. Neither of two modes of SCAG valve operation caused any significant difference in G tolerance nor in assessment of AGS comfort. When protected by supination and the AGS, sufficiently increasing G onset times reduced G tolerance. Adverse comments and low ratings for AGS comfort followed exposure to most G pulses when the subjects were protected by high levels of AGS bladder pressure. Author (GRA)

**N84-24088\*#** National Aeronautics and Space Administration, Washington, D. C.  
**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 258)**  
 May 1984 91 p  
 (NASA-SP-7011(258); NAS 1.21:7011(258)) Avail: NTIS HC \$7.00 CSCL 06E

This bibliography lists 308 reports, articles and other documents introduced into the NASA scientific and technical information system in April 1984. E.A.K.

**N84-24089#** Arizona State Univ., Tempe. Human Performance Lab.  
**BIOCHEMICAL MEASUREMENTS OF THE HUMAN STRESS RESPONSE Final Report**  
 G. S. KRAHENBUHL and J. HARRIS Mar. 1984 63 p  
 (Contract F33615-80-K-0022; AF PROJ. 2313)  
 (AD-A139381; AFHRL-TR-83-40) Avail: NTIS HC A04/MF A01 CSCL 06S

The threefold purpose of the study was (a) to identify biochemical response patterns to specific modes of stress, (b) to continue the search for suitable methods of quantifying stress in operational settings, and (c) to compare biochemical and psychophysiological stress indices. Three experiments were conducted using Air Force pilots as subjects. One experiment focused on the biochemical responses of student and instructor pilots who were involved in flight precautions or emergencies. A second experiment explored the biochemical response patterns to different modes of stress. The third experiment assessed the relationship between biochemical and psychophysiological indices in pilots performing a task in a simulated hostile environment. When viewed in its entirety, data collected in the contract demonstrate a general response to a variety of stress modes, which is characterized by an increase in the excretion of epinephrine and norepinephrine, a decrease in the ratio of dopamine to norepinephrine, and an increase in the ratio of norepinephrine to serotonin. When examined individually, the experiments revealed the following. Although there were some excretion patterns common to all stress conditions, specific response patterns were also noted for various modes of stress. A battery of indices was identified which reflected the stress response across many modes of stress in a variety of field settings, and biochemical and psychophysiological indices did not show good agreement. GRA

**N84-24090#** Wisconsin Univ., Madison. School of Pharmacy.  
**HYPERPYREXIA AND HEAD TRAUMA Final Report, 1975 - 1983**  
 T. A. RUDY 9 Mar. 1984 17 p  
 (Contract N00014-75-C-0939)  
 (AD-A139420) Avail: NTIS HC A02/MF A01 CSCL 06O

Unilateral mechanical lesions of the anterior hypothalamic/preoptic (AH/PO) region of the rat were found to produce immediate pyrexia. The pyrexia was generated by the coordinated activation of heat gain and heat retention effectors. Its magnitude was not strongly affected by ambient temperature, and the plateau level of pyrexia was well defended in the face of forced perturbations of core temperature. Pyrexia could be prevented and reversed by the prostaglandin synthesis inhibitor, indomethacin. Intraventricular injection of fresh blood or serum

derived at 37 deg C for from 2 hours to 21 days produced pyrexia in cats. Pretreatment of the cats with indomethacin prevented the pyrexia produced by the serums but including indomethacin in the incubating blood did not. These results indicate that prostaglandins are importantly involved in the production of pyrexia by AH/PO trauma and by intraventricular bleeding. Studies of the central nervous system site of action of prostaglandins in the production of pyrexia using a microinjection mapping method showed that the AH/PO region is the sole site of action in the upper portion of the rat brain. GRA

**N84-24091#** Navy Personnel Research and Development Center, San Diego, Calif.

**EVALUATION OF EYE MOVEMENT TRAINING FOR NAVY PILOTS Final Report, Jul. 1982 - Sep. 1983**

W. F. THODE, P. J. TREMONT, and W. H. SMITH Feb. 1984 24 p

(Contract ZR0-0001)

(AD-A139489; NPRDC-TR-84-28) Avail: NTIS HC A02/MF A01 CSCL 05I

A training program designed to enhance eye movement skills was examined to determine if Navy pilot's eye movements could be improved and if the improvement correlated with improvements in pilot performance. Results showed that eye movement skills were improved, but no relationship between the improved skills and available performance criteria could be identified.

Author (GRA)

**N84-24092#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**THE EFFECTS OF GX, GY AND GZ FORCES ON CONE MESOPIC VISION Technical Report**

D. A. TIMPTON Oct. 1983 58 p

(Contract AF PROJ. 7231)

(AD-A139498; AFAMRL-TR-83-047) Avail: NTIS HC A04/MF A01 CSCL 06S

The effects of Gx, Gy, and Gz acceleration forces on cone-type mesopic vision threshold values are examined. An experimental has been conducted on the Dynamic Environment Simulator, a three-axis human centrifuge, to reproduce an acceleration environment in a simulated night flight combat situation. Acceleration environments studied were levels of +1Gz, +1Gy, +1Gy, +1.4Gz, +2.0Gz, +3.0Gz, +2.0Gy in combination with +1Gz. A visual task was performed which determined 20/50 visual acuity illumination threshold values. The +gz environment is known to cause profound visual symptoms at relatively high levels. Physiological parameters recorded were PaO<sub>2</sub>, by ear oximetry, heart rate, and visual acuity threshold values. Results were zero means obtained by self pairing with +1Gz controls. Analysis was done by two tailed t-test. Results showed no significant shift if luminance threshold values at +1Gy or +1.4Gz; significant increase in luminance threshold at the .05 level for +1Gz; and significant increase in luminance threshold at the .01 level for +2.0Gz, +3.0Gz, and +2.0Gy in combination with +1Gz. Results will be discussed with respect to individual variation, daily variation, wearing of glasses, cardiovascular effects, effects of head movement, and pulmonary effects. GRA

**N84-24093#** Michigan Univ., Ann Arbor. Perception Lab.

**THE DETECTION OF NONPLANAR SURFACES IN VISUAL SPACE**

W. R. UTTAL, J. BROGAN, K. MCCREIGHT, S. ROBERTSON, and P. WHITE 1 Mar. 1984 268 p

(Contract N00014-81-C-0266; RR0-4209)

(AD-A138761; PERLAB-4) Avail: NTIS HC A12/MF A01 CSCL 06P

This monograph presents the results of a series of 17 experiments designed to provide a partial answer to two questions concerning the detection of dotted forms in dotted visual masks: (1) What is the effect of the spatial geometry of three-dimensional, nonplanar forms on their detectability? (2) What is the effect on the signal-to-noise ratio on their detectability? The results of the study indicate that the spatial geometry exerts virtually no effect

until a threshold level of geometrical complexity is exceeded by the stimulus forms. Beyond that threshold, the effects of form are significant but modest in absolute amplitude. The results further indicate that a putative large effect of form obtained with sinusoidal stimuli actually results from a violation of the Shannon-Weaver sampling theorem from information theory and is thus due to inadequate definition of the form rather than to the nature of the form. On the other hand, the signal-to-noise ratio strongly influences detectability, regardless of whether it is manipulated by varying the number of dots in the stimulus-form or by varying the number of masking dots. This study failed to extend a highly successful autocorrelation-type theory from two-dimensions to three-dimensions. The implications and background of this study are discussed in detail. GRA

**N84-24094#** Saint Louis Univ., Mo. Dept. of Physiology.

**CARDIOVASCULAR AND RESPIRATORY RESPONSES TO MUSCULAR ACTIVITY DURING IMMERSION IN WATER AT DIFFERENT TEMPERATURES Final Report, 1977 - 1981**

A. R. LIND, D. PHIL, T. E. DAHMS, C. A. WILLIAMS, and J. S. PETROFSKY 5 Mar. 1984 18 p

(Contract N00014-77-C-0640)

(AD-A138894) Avail: NTIS HC A02/MF A01 CSCL 06S

The thrust of this research program was to investigate muscular function during both sustained and intermittent isometric contractions as well as during rhythmic exercise carried out in air or during immersion of subjects to the neck in water at temperatures ranging from 15 C to 35 C. In one experiment the subjects were examined when they were completely under water. The limitations placed on muscular function in those varied circumstances may be related to the limits of flexibility of the cardiovascular and respiratory systems, to the temperature of the muscles and to the metabolic demands in aerobic, anaerobic and fatiguing exercise. Such events may place unexpected demands on both cardiovascular and respiratory function. Isometric exercise, either sustained or intermittent, was chosen to simulate carrying weights underwater, while bicycling, with the legs horizontal was chosen to approximate swimming. Studies were carried out to evaluate the changes that occur as a result of habituation to immersion in cold water. In addition, the mechanisms that compete for the local control of the circulation were examined during intermittent isometric contractions leading to muscular fatigue. GRA

**N84-24095#** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**AIRSICKNESS DURING NAVAL FLIGHT OFFICER TRAINING: FLEET READINESS SQUADRONS**

W. C. HIXSON, F. J. GUEDRY, J. M. LENTZ, and G. L. HOLTZMAN 14 Dec. 1983 60 p

(Contract DA PROJ. F58-524)

(AD-A138973; NAMRL-1305) Avail: NTIS HC A04/MF A01 CSCL 06E

This report documents the incidence and severity of airsickness experienced in 14 different fleet readiness squadrons (FRS) by 372 NFO students who flew a total of 8,325 hops during this phase of training. Treating this entire population as a single group, airsickness was reported to have occurred on 637 (7.65 percent) of the 8,325 hops, vomiting on 252 (3.03 percent) of the hops, and in-flight performance degradation due to airsickness on 303 (3.64 percent) of the hops. Though these figures are lower than those reported previously for the primary and secondary phases of training, the FRS data showed significant variations according to the type-specific aircraft training pipeline followed by the students. Particularly noticeable were the high incidence rates occurring in the P-3 pipeline during FRS training. The report discusses probable causes for these pipeline variations based upon differences in the flight syllabi associated with each phase of training within a given pipeline. The report also relates student performance on the candidate motion reactivity tests to in-flight airsickness performance during different phases of training. GRA

**N84-24517# Joint Publications Research Service, Arlington, Va.  
CONTRIBUTIONS OF SPACE MEDICINE TO MEDICAL  
RESEARCH Abstract Only**

O. G. GAZENKO, I. P. NEUMYVAKIN, Y. A. KOVALENKO, R. M. BAYEVSKIY, and B. B. YEGOROV *In its USSR Rept.: Life Sci.: Biomed. and Behavioral Sci. (JPRS-UBB-84-007) p 1-2 13 Apr. 1983 Transl. into ENGLISH from Zdorovye (USSR), no. 4, Apr. 1983 p 10-11*

Avail: NTIS HC A05/MF A01

Recent advances in space medicine and related medical research applications are presented. The effects of weightlessness on human mental and physical performance as well as physiochemistry are discussed. Technology transfer of spaceborne monitoring and electrophoresis to general medical use is described. M.A.C.

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## BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

**A84-30868  
DIURNAL RHYTHMICITY AND AIR FORCE FLIGHT ACCIDENTS  
DUE TO PILOT ERROR**

J. RIBAK, I. E. ASHKENAZI (Tel Aviv University; Israel Air Force, Aeromedical Center, Tel Aviv, Israel), A. KLEPFISH, D. AVGAR, J. TAL, B. KALLNER, and Y. NOYMAN (Israel Air Force, Aeromedical Center, Tel Aviv, Israel) *Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Dec. 1983, p. 1096-1099. refs*

In order to evaluate the possible role of an endogenous rhythmic factor in Air Force flight accidents, a retrospective study was carried out. The study included all Air Force (aircraft) flying accidents which have been attributed to pilot's error and which occurred, on peace time missions, over a period of 12 years (1968-1980). The frequency of hourly accidents was computed separately, for each year, for each month, for each day of the week, and for each calendar day. Identical computations were carried out for the frequency of hourly flights. When the hourly ratios of these two parameters were computed, by dividing the value of one parameter to the other at each hour, a rhythmic (rather than constant) diurnal pattern was obtained. The pattern was defined as the 'hourly accident coefficient (HAC)'. The HAC values ranged from 1.58 to 0.68 (pooled data for all surveyed aircraft) and from 4.12 to 0.74 (data for fighter planes). The pattern, which exhibited a diurnal rhythm, was independent of the frequency of flights and appeared to be related to the sleep-wake cycle of the pilots, especially to the time of waking from the night sleep. The results are used as a directive for a progressive study aimed at evaluating the practical implications of the presented observations. Author

**A84-32351  
THE MEANING OF THE NOTIONS 'ABILITY' AND 'TALENT' [O  
SODERZHANII PONIATII 'SPOSOBNOSTI' I 'ODARENOST']**  
V. D. SHADRIKOV *Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 3-10. In Russian. refs*

**A84-32352  
THE POSSIBILITY OF DIFFERENTIATING FUNCTIONAL  
LEVELS THROUGH THE METHOD OF MULTIDIMENSIONAL  
GROUPING [O VOZMOZHNOСТИ VYDELENIYA UROVNEI  
FUNKTSIONIROVANIYA METODOM MNOGOMERNOI  
GRUPPIROVKI]**

N. E. VODOPIANOVA and V. V. SHCHEGOLEV *Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 32-37. In Russian. refs*

Functional levels are defined as system formations that are qualitatively and quantitatively different from one another, both with respect to external parameters of efficiency (parameters

describing a result) and to the internal, psychological basis of activity. In accordance with this definition, the classification of functional levels must be based on the aggregate of the informative parameters that describe the two necessary aspects of activity, namely result and process. The method outlined here for multidimensional grouping makes it possible to differentiate informative actions and their parameters on the basis of the results obtained from a component-target analysis. On the basis of informative parameters, the entire aggregate of sequential actions can be broken down into homogeneous groups, each corresponding to a defined functional level. The functional levels that reflect the result and process aspects of activity can be used as measures of efficiency. It is noted that the significance of individual mental components of activity can vary depending on the functional level. C.R.

**A84-32353  
SIGNIFICANCE OF ALLOWING FOR INDIVIDUAL DIFFERENCES  
IN ORGANIZING THE WORK SHIFT IN MONOTONOUS  
PRODUCTION WORK [O ZNACHIMOSTI UCHETA  
INDIVIDUAL'NYKH RAZLICHII PRI RASSTANOVKE RABOCHEI  
SMENY NA MONOTONIZIROVANNYKH PROIZVODSTVAKH]**  
N. P. FETISKIN and V. I. MOLODTSOVA *Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 101-110. In Russian. refs*

**A84-32354  
THE BRAIN-PSYCHE PROBLEM AND PRESENT-DAY  
PHYSIOLOGY [PROBLEMA 'MOZG I PSIKHIKA' I  
SOVREMENNAIA FIZIOLOGIYA]**  
A. M. IVANITSKII *Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 122-131. In Russian. refs*

**A84-32356  
THE SPATIAL ORGANIZATION OF BIOELECTRIC POTENTIALS  
IN THE HUMAN NEOPALLIUM AND ITS INFORMATION  
ANALYSIS [PROSTRANSTVENNAIA ORGANIZATSIYA  
BIOPOTENTSIALOV NEOKORTEKSA CHELOVEKA I EE  
INFORMATSIONNYI ANALIZ]**  
V. N. KIROI and T. A. PETROSOVA *Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 142-146. In Russian. refs*

Informational processes occurring in various regions of the brain at various stages of a psychophysiological experiment are investigated with the aid of parameters of bioelectric activity. Experimental data are obtained which point to a relative lack of variation in the spatial topography of the EEG correlation coefficients from the electrogram parameters selected. A lowered level of spatial synchronization in the bioelectric potentials of the frontal, parietal, and occipital regions of the neopallium is observed when solutions are being sought to test problems. Information analysis of the invariant indicators of the system activity of the brain makes clear the leading role played by the frontal, left parietal, and right occipital regions of the cortex in solving problems of the type discussed here. C.R.

**A84-32392  
A COMPUTER SIMULATION OF DECISION MAKING IN  
AUDITORY DETECTION [MODELIROVANIYE NA EVM PRINIATIIA  
RESHENIIA PRI SLUCHOVOM OBNARUZHENII]**  
IU. A. INDLIN (Nauchno-Issledovatel'skii Institut Kinematografii i Fotografii, Moscow, USSR) *Voprosy Psikhologii (ISSN 0042-8841), Sept.-Oct. 1983, p. 99-105. In Russian. refs*

**A84-32963  
A DELAY IN THE VISUAL PERCEPTION OF MOTION IN FLIGHT  
SIMULATORS [NEZADOUCI ZPOZDENI VIZUALNIHO  
POHYBOVEHO VJEMU NA LETECKYCH SIMULATORECH]**  
J. SVEDIK *Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1983, p. 217-223. In Czech. refs*

The dynamic properties of TV-based visual orientation systems are examined. In particular, an analysis is made of the factors that cause the time delay in the visual perception of motion typically observed in two commonly used types of flight simulators. In one of the systems, the video signal is generated by a computer,

whereas in the other system, the image is obtained using a TV camera and a terrain mockup. In the latter case, the undesired effects associated with the TV transmission of an image are discussed. V.L.

**N84-23102** British Aerospace Dynamics Group, Bristol (England). Human Factors and Vision Research Dept.

**A POTENTIALLY POWERFUL METHOD OF SIMPLE AUTOMATIC RECOGNITION EXHIBITING SCALE AND ORIENTATION INDEPENDANCE**

I. OVERINGTON 20 Jan. 1981 13 p refs  
(BAE-BT-11088) Avail: Issuing Activity

Preprocessing carried out by the human visual system is discussed, and a concept of progressive profile form recognition is proposed. It consists of sensing presence of a local bounded object, deducing its centroid, highlighting the profile, deducing the zones of maximum rate of change of profile orientation, registering radii and relative angles of corner vectors from the centroid as origin in cyclic order, deriving ratios of adjacent corner radii and difference angles for adjacent radii, bisecting angles between adjacent radii and comparing new vector radii to the vector radii to chords joining corners, registering new profile intersections as additional corners as necessary and continuing bisecting and comparing to whatever fidelity is required. For low level recognition it is rarely necessary to carry out more than one or two bisection stages. Author (ESA)

**N84-23103** British Aerospace Dynamics Group, Bristol (England). Human Factors and Vision Research Dept.

**SOME CONSIDERATIONS OF FORMS AND DISTRIBUTIONS OF RECEPTIVE FIELD UNITS IN EARLY VISUAL PROCESSING**

I. OVERINGTON 20 Jan. 1981 14 p refs  
(BAE-BT-11177) Avail: Issuing Activity

The existence of multiple parallel channels for local visual processing of sustained images by primates, and whether the visual system carries out Fourier analysis of images are discussed. An image processing scheme is proposed. Primary image formation is by an optical system with a spread function relatively broad compared with the sampling resolution of the following detector system. Parallel local interactive processing is by a group of concentric excitatory/inhibitory receptive fields of cylindrical form and of center/surround ratio 3:1. A broad exponential skirt exists for the largest receptive field unit. The resultant spatial frequency response has 10% dips in local frequency response compared to a smooth contrast sensitivity type of function. There is no Fourier analysis except by inference for very local image components or for periodic texture. Relative constancy of form information irrespective of size occurs by progressive coarsening of receptive fields away from a central foveal region. Author (ESA)

**N84-23104** British Aerospace Dynamics Group, Bristol (England). Human Factors and Vision Research Dept.

**SOME OBSERVATIONS ON RELATIVE APPROACHES TO VISUAL ACQUISITION MODELLING**

I. OVERINGTON 20 Jan. 1982 7 p refs  
(BAE-BT-11241) Avail: Issuing Activity

The MRTD/Johnson and ORACLE/CYCLOPS visual models are assessed for comparison and specification of target recognition systems. It is concluded that a form of MRTD modeling, starting from either an NVL-based or ORACLE-based foundation, is adequate for routine comparison of existing systems. For systems specification a much more rigorous approach involving search and peripheral vision is necessary. Author (ESA)

**N84-23105** British Aerospace Dynamics Group, Bristol (England).

**DETECTION OF HORIZONTAL BARS AS A FUNCTION OF LENGTH, SEPARATION, ECCENTRICITY AND FREQUENCY OF TEMPORAL MODULATION: POSSIBLE APPLICATIONS TO HELICOPTER ACQUISITION**

N. J. PUZEY and L. K. B. HOLMAN 30 Mar. 1981 22 p refs  
(BAE-BT-11288) Avail: Issuing Activity

The effects of frequency of luminance modulation and retinal eccentricity in the horizontal and vertical axes on the contrast threshold for detection of one or two horizontal bars was studied using stimuli chosen to represent the rotor tips of an Mi-24 helicopter gunship at particular distances. The use of rotor tip flicker for detection was considered. Compared with stationary stimuli, contrast sensitivity of observers decreases when the stimulus is flickering, so in naked eye viewing rotor tip flicker does not aid helicopter acquisition. Typical rotor tip flicker frequency for an Mi-24 is 20 Hz, well away from the region in which human observers are most sensitive (5 to 10 Hz). Author (ESA)

**N84-23106** British Aerospace Dynamics Group, Bristol (England). Human Factors Research Dept.

**MODELLING OF VISUAL SEARCH PERFORMANCE**

K. J. COOKE 18 Oct. 1983 25 p refs  
(BAE-BT-14588) Avail: Issuing Activity

The ORACLE vision model was calibrated for search exercises against targets growing in size and contrast. Antitank modeling highlighted its limitations for static scenes. Computer modeling reliability for static targets was improved. Author (ESA)

**N84-23107#** Purdue Univ., Lafayette, Ind. School of Electrical Engineering.

**NEW TECHNIQUES FOR MEASURING SINGLE EVENT RELATED BRAIN POTENTIALS Final Report**

C. D. MCGILLEM and J. I. AUNON 15 Oct. 1983 86 p  
(Contract AF-AFOSR-0152-80; AF PROJ. 2313)  
(AD-A138694; AFOSR-84-0127TR) Avail: NTIS HC A05/MF A01 CSCL 12A

Methods for selecting features of evoked patented (EP) waveforms to improve classification accuracy are described. It is found that use of an exhaustive search procedure gives moderate improvement over forward sequential feature selection and stepwise linear discriminant analysis procedures. A new procedure for classification using a combination of temporal and spectral representations of the data is described. Experimental results are presented illustrating the effectiveness of time-varying filters for processing EP waveforms. It is shown by means of computer simulations that much greater noise reduction is obtained with time-varying filters than is possible by any of the more conventional procedures that utilize time-invariant filters. At the same time the underlying waveforms are preserved by the filtering process. Modifications of a computer controlled display system to give precise timing measurements are described. Data showing the reduction in latency variance of EP components are presented. Reductions in the standard deviations of about 20% were obtained. Experimental measurements of EP waveforms using a Sternberg paradigm are described. Preliminary analysis of the results shows an apparent substructure in the P300 and a significant correlation of certain of the P300 components and reaction time. Author (GRA)

**N84-23108#** Michigan Univ., Ann Arbor. Perception Lab.

**DETECTION OF DOTTED FORMS IN A STRUCTURED VISUAL NOISE ENVIRONMENT**

M. J. YOUNG 1 Mar. 1984 56 p  
(Contract N00014-81-C-0266)  
(AD-A138853; PERLAB-3) Avail: NTIS HC A04/MF A01 CSCL 06P

Five experiments are described which explore the human observer's ability to detect single dotted lines masked by other dotted lines. Stimuli are presented tachistoscopically on a computer controlled cathode ray tube. Results indicate that: Rotations of the stimuli, relative to the orientation of the noise lines, improve

detection performance only if the rotations are made around the Z axis. Rotations around the Y axis fail to improve detection performance. The mechanism involved in the detection of dotted forms uses different strategies or algorithms depending upon the density of the noise mask. Orienting the stimulus and masking lines to other than the horizontal decreases detection performance. The results are discussed in the context of model incorporating a variable aperture attentional process. Author (GRA)

**N84-23109#** Perceptronics, Inc., Menlo Park, Calif. Knowledge Systems Branch.  
**ALTERNATIVE KNOWLEDGE ACQUISITION INTERFACE STRUCTURES Final Technical Report, Sep. 1982 - Sep. 1983**  
 K. T. WESCOURT and P. W. THORNDYKE Orlando, Fla. Naval Training Equipment Center Dec. 1983 104 p  
 (Contract N61339-82-C-0151)  
 (AD-A139019; PPAFTR-1131-83-1; NAVTRAEQUIPC-82-C-0151-1)  
 Avail: NTIS HC A06/MF A01 CSCL 05I

This research developed a design concept for an interactive system to acquire domain knowledge from a training expert. Such a system would facilitate the development of knowledge-based instructional systems by directly eliciting and encoding from domain experts knowledge needed to deliver instruction. An analysis of the process by which knowledge-based systems are constructed indicates that the generality of a knowledge acquisition system must be limited by domain characteristics and by the architecture of the system it serves, and the non-sequential, interacting activities during system development constrain the potential role of automated knowledge acquisition aids. A feasible concept for knowledge acquisition technology, building on prior research in artificial intelligence, involves the notion of class-generic systems for a related set of domains with a fixed architecture and training capabilities. This concept is developed and discussed in the context of proposed Navy training systems for acquiring models of trainee performance during learning, rules of behavior for an automated opponent in a tactics trainer, and a knowledge base of facts to be subsequently presented to trainees for memorization. GRA

**N84-23110#** Oklahoma Univ., Norman. Decision Processes Lab.  
**ABILITY AND EXPERTISE IN ACT GENERATION Interim Report**  
 P. D. ENGELMANN and C. F. GETTYS 30 Sep. 1983 38 p  
 (Contract N00014-80-C-0639)  
 (AD-A137973; AD-E750824; TR-30-09-83) Avail: NTIS HC A03/MF A01 CSCL 05J

Act generation is a process used by decision makers to create a set of possible actions that might solve a problem. Since previous research has shown college students to generate incomplete sets of possible actions in act generation, the sets of actions generated by experts were examined in the first of two experiments to see if they were more complete. In the first of the two experiments, graduate psychology students were given an act generation task on a subject at which they were expert. Verbal behavior was recorded to aid in the description of expert performance. In the second experiment the same graduate psychology students were given a task at which their expertise should be of little or no value and were compared to a group of undergraduates. Measures of act generation performance in both experiments included measures of quantity and quality of actions generated. Since excellent act generation performance of graduate psychology students was found in tasks at which they were either expert or non-expert, divergent intellectual ability was implicated as the source of their excellence. In conclusion, while high intellectual ability was shown to be valuable in generating a nearly exhaustive set of actions, the issue of the effect of expertise on act generation performance remains unsettled. GRA

**N84-23111#** Oklahoma Univ., Norman. Decision Processes Lab.  
**PROBLEM ANALYSIS AND DEFINITION IN ACT GENERATION Interim Report**  
 C. F. GETTYS, M. KELLEY, R. M. PLISKE, and J. W. BECKSTEAD 8 Aug. 1983 49 p  
 (Contract N00014-80-C-0639)  
 (AD-A137978; TR-8-8-83) Avail: NTIS HC A03/MF A01 CSCL 05J

Three experiments are reported which provide converging evidence suggesting that problem analysis and definition is an important component in generating actions that might solve a problem. Subjects in the first experiment were given two types of cues to help them create solutions to a typical shortage problem. Subjects were able to translate the generic cues into specific implementations as expected, but were relatively unsuccessful at extracting the generic 'kernels' from cues that were in the form of specific implementation and creating variations of these 'kernels'. The second experiment explored the 'incubation' phenomena by having subjects resume generating possible solutions to a problem one week after their initial attempt. It was found that problem reorganization rarely occurred between the first and second sessions, and that most of the ideas generated in the second session were elaborations or variations of first-session ideas. The third experiment examined the effects of explicit training in problem analysis and definition. Subjects who received this training showed an improved ability to generate examples of most of the generic solutions to the problem, and tended to generate more indirect solutions to the problem. GRA

**N84-23112#** Purdue Univ., Lafayette, Ind. Dept. of Psychological Sciences.  
**PERSONNEL TECHNOLOGY: PERFORMANCE APPRAISAL, A PROCESS APPROACH Final Report, 15 Jun. 1982 - 14 Aug. 1983**  
 J. L. BARNES-FARRELL and D. R. ILGEN Oct. 1983 15 p  
 (Contract N00014-82-K-0449; RR0-4208)  
 (AD-A138359; TR-83-5) Avail: NTIS HC A02/MF A01 CSCL 05J

This report briefly outlines research performed under a contract awarded for investigating processes affecting the accuracy of performance appraisals. A general overview of the research is provided, followed by a listing of major topic areas investigated and reference to the research reports that describe the research in detail. An Appendix to the report lists the titles of the technical reports, presentations at professional meetings, and theses or dissertations that resulted from the research. Author (GRA)

**N84-24096#** Washington Univ., Seattle. Dept. of Psychology.  
**PERFORMANCE IN DUAL TASKS Final Technical Report, 1 Apr. 1977 - 29 Feb. 1984**  
 E. HUNT and M. LANSMAN 29 Feb. 1984 43 p Prepared in cooperation with North Carolina Univ. at Chapel Hill.  
 (Contract N00014-80-C-0631)  
 (AD-A138603; TR-84-2) Avail: NTIS HC A03/MF A01 CSCL 05J

The goal of this project was to construct a single theoretical framework for the analysis of problem solving and real time 'attention and performance' behavior. Such a model has been developed. It has been realized as a computer program. The program is designed in a manner similar to that of various problem solving simulations that use the 'production system' approach. The program has been used to simulate results from choice reaction time, stimulus repetition, dual channel monitoring, and conflicting stimulus (Stroop) paradigms. In the development of the model several questions arose concerning human performance in situations requiring attention allocation. Experiments were conducted that showed that the mediation of attention allocation by stimulus frequency occurs through the automatic processing system, while attention allocation mediated by warning signals occurs through the controlled processing system. Further studies suggest that individual differences in the ability to control attention are specific to a stimulus modality, rather than due to a generalized



ability to control attention. The theoretical framework developed here has been used as an integrative device to order the literature on individual differences in cognition, verbal comprehension, and techniques for assessing an individual's ability to memorize and recall information. Author (GRA)

**N84-24097#** Washington Univ., Seattle. Dept. of Psychology.  
**A UNIFIED MODEL OF ATTENTION AND PROBLEM SOLVING**  
E. HUNT and M. LANSMAN Feb. 1984 44 p Lecture held at New Haven, Conn., 1983  
(Contract N00014-80-C-0631)  
(AD-A138787; AD-F300387; TR-84-1) Avail: NTIS HC A03/MF A01 CSCL 05J

The concept of production-executing machines has been used to construct a number of simulations of human problem solving. With a few exceptions the simulations have been of problem solving in situations in which there is no real-time pressure to respond. Such situations are typical of the paradigms used to study attention and performance. A model of production selection and execution has been developed that subsumes the previous problem solving models and that can be applied to real-time situations. The model has been used to simulate human performance in choice reaction time, stimulus repetition, dual task, and cue-conflict (Stroop) situations. This extends the use of production system models to encompass both problem solving and attention limited behavior. Author (GRA)

**N84-24098#** Washington Univ., Seattle. Dept. of Psychology.  
**SOCIAL SUPPORT AND PERFORMANCE IN COMPLEX ORGANIZATIONS Final Report, 1 Jun. 1980 - 31 Dec. 1983**  
I. G. SARASON 30 Jan. 1984 25 p  
(Contract N00014-80-C-0522)  
(AD-A138888; CO-ONR-010) Avail: NTIS HC A02/MF A01 CSCL 05K

This is the Final Report of a research project carried out between June 1, 1980 and December 31, 1983. Nine technical reports and fourteen articles resulted from the project. The research dealt with social support, its assessment, relationship to performance, and stability over time. The findings showed that social support is related to performance, interpersonal skills and relationships in a complex organization. Social support provided in a performance situation was found to be especially helpful for individuals who perceived low levels of support in their personal lives. Author (GRA)

**N84-24099#** Pittsburgh Univ., Pa. Learning Research and Development Center.  
**PROBLEM SOLVING AND REASONING**  
J. G. GREENO and H. A. SIMON Feb. 1984 152 p  
(Contract N00014-79-C-0215; RR0-4206)  
(AD-A138889; UPITT/LRDC/ONR/APS-14) Avail: NTIS HC A08/MF A01 CSCL 05I

This long chapter reviews research on problem solving and reasoning; the intended use is as text material for advanced students and others needing a moderately detailed introduction to the topics. The orientation is primarily psychological, with significant attention given to results from artificial intelligence. Major theoretical concepts, such as problem representation, the problem space, strategic knowledge, and problem-solving search, are developed in detail; and major empirical methods such as thinking-aloud protocols, problem-behavior graphs, and use of error patterns and latencies, are described and illustrated. Sections of the chapter include: Problems with well specified goals and procedures, Problems of design and arrangement, Inductive problem solving, and Evaluation of deductive arguments. Author (GRA)

**N84-24100#** Naval Postgraduate School, Monterey, Calif.  
**DEVELOPMENT OF THE A-6E/A-6E TRAM/KA-6D NATOPS (NAVAL AIR TRAINING AND OPERATING PROCEDURES STANDARDIZATION) CALCULATOR AIDED PERFORMANCE PLANNING SYSTEM (NCAPPS) M.S. Thesis**  
D. F. HARGRAVE Dec. 1983 137 p  
(AD-A138897) Avail: NTIS HC A07/MF A01 CSCL 01C

The performance data contained in the Naval Air Training and Operating Procedures Standardization (NATOPS) manuals for Naval aircraft are presented primarily in graphical form. Interpretation of these graphical charts is time consuming and susceptible to error. By using multiple regression analysis and other curve fitting techniques the graphical charts can be modeled with closed-form analytical equations. These equations can then be used in computer programs which perform the same functions as the original charts but with greater accuracy, speed and simplicity. This thesis conducts the above analysis on some of the more commonly used NATOPS performance data for the A-6 aircraft model. The result is the A-6E/A-6E TRAM/KA-6D NATOPS Calculator Aided Performance Planning System (NCAPPS) which is a library of A-6 performance software developed for the Hewlett-Packard HP-41CV hand-held programmable calculator. Procedures for developing the analytical models are described and a user's manual documenting the system is included. Author (GRA)

**N84-24101#** Hershey (Milton S.) Medical Center, Hershey, Pa. Dept. of Behavioral Science.  
**EFFECTS OF STRESSORS ON TASK PERFORMANCE AND SATISFACTION Final Report**  
S. STREUFERT, S. C. STREUFERT, R. M. POGASH, and A. L. DENSON Feb. 1984 13 p  
(Contract N00014-80-C-0581)  
(AD-A139039) Avail: NTIS HC A02/MF A01 CSCL 05J

The present report presents a summary of efforts on a research project concerned with stressor effects on task performance (in simple and in complex tasks), on satisfaction and physiological responsivity. The orientation of the research project is discussed. Abstracts of all technical reports prepared during the contract period are presented. Finally, some of the major findings are listed. GRA

**N84-24102#** California Univ., Santa Barbara.  
**RESEARCH AGENDA IN NON-LINEAR DECISION SYSTEMS**  
Nov. 1983 81 p refs  
(Contract NSF OIR-82-12817)  
(PB84-161207; NSF/OIR-83006) Avail: NTIS HC A05/MF A01 CSCL 05J

Discussions presented at the workshop are summarized. Non-linear systems are identified as that class of open systems whose non-linear interactions permit evolution through bifurcation and self-structuring, and whose driving influences are the decisions of humans, both as individuals and interacting in groups. The concept of evolutionary systems is established as the overarching paradigm for non-linear decision systems, and these systems are explored within the context of the evolutionary paradigm. Representative research topics in non-linear decision systems are examined, including geographical evolution, urban and regional modeling, cognitive locus theory, cognitive process modelling of individual and aggregate decision making, periodic markets, evolutionary stages of national systems, and design of large infrastructure systems. Workshop participants are listed. GRA

**N84-24155#** Osaka Electro-Communication Univ. (Japan). Dept. of Management Engineering.  
**FUZZY REASONING UNDER NEW COMPOSITIONAL RULES OF INFERENCE**  
M. NIZUMOTO In Northwestern Univ. The 13th Intern. Symp. on Multiple-Valued Logic p 273-278 1983 refs  
(AD-P002364) Avail: NTIS HC A19/MF A01 CSCL 05J

This paper indicates that most of fuzzy translating rules for a fuzzy conditional proposition If x is A then y is B with A and B being fuzzy concepts can infer very reasonable consequences



which fit our intuition with respect to several criteria such as *modus ponens* and *modus tollens*, if new compositions and called *max-O* composition and *max-A* composition are used in the compositional rule of inference, though, as was pointed out previously, reasonable consequences can not always be obtained when using the *max-min* composition which is used usually in the compositional rule of inference. Author (GRA)

**N84-24156#** Duke Univ., Durham, N. C. Dept. of Electrical Engineering.

#### **A STUDY OF FUZZY RELATIONS AND THEIR INVERSE PROBLEM**

M. TOGAI (Bell Telephone Labs., Inc., Holmdel, N.J.) and P. P. WANG /in Northwestern Univ. The 13th Intern. Symp. on Multiple-Valued Logic p 279-285 1983 refs (AD-P002365) Avail: NTIS HC A19/MF A01 CSCL 05J

This paper consists of two main topics relating to the fuzzy logic and reasoning: fuzzy implication and its inverse problem. Firstly, the characteristic difference of various types of implication functions will be analyzed by introducing two new relations: namely the joint relation and the conditional one. Secondly, a novel method to find upper and lower bounds of the solution of fuzzy inverse problem is introduced. In addition to the conventional *man-min* operation, we propose a new operation, namely *p,omega*-composition, to solve the problem effectively. Theorems concerning the bounds and the composite mappings of fuzzy sets are also presented. Author (GRA)

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### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

**A84-30368**

#### **MOST INTERESTING CHARACTERISTICS OF 6709 CENTRIFUGE IN THE SCOPE OF AEROSPACE MEDICINE AND PHYSIOLOGY**

G. PIERRON, M. CARLES (Societe Industrielle d'Aviation Latecoere, Toulouse, France), A. BES, and A. GUELL (Centre Hospitalier Universitaire Rangueil, Toulouse, France) IN: Space physiology; Colloquium, Toulouse, France, March 1-4, 1983, Proceedings. Toulouse, France, Cepadues-Editions, 1983, p. 461-470.

The centrifuge makes it possible to subject human beings to accelerations (up to 10 G) that vary in direction and in time. Materials can be subjected to accelerations of up to 35 G. The cabin is fitted with medical equipment of high sensitivity which makes it possible to monitor the subject in a comprehensive way. The design of the centrifuge is described and a detailed description is given of the medical equipment. The machine has an estimated lifetime of 30 years. C.R.

**A84-30599**

#### **MODEL OF THE CENTRAL REGULATION OF MOTOR TRAJECTORY PARAMETERS [MODEL' TSENTRAL'NOI REGULIATSII PARAMETROV DVIGATEL'NYKH TRAEKTORII]**

S. V. ADAMOVICH and A. G. FELDMAN (Akademiia Nauk SSSR, Institut Problema Peredachi Informatsii, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Mar.-Apr. 1984, p. 306-309. In Russian. refs

A wave model for the central process of the parameterization of the trajectories of changes in muscle torque or joint angles is presented, and two central commands controlling the activity of a pair of antagonistic muscles are defined. The reciprocal command leads to a parallel displacement of the so-called invariant characteristic, the torque-joint angle, which has a reflexive nature and is conditioned by the combined action of flexors and extensors. The coactivation command changes the inclination of the invariant

characteristic, leading to the combined activation or relaxation of flexors and extensors. It is proposed that the gradation of a uniform command, such as the reciprocal command, is accomplished through the principle of consecutive superposition. The terminal position of the wave front of the reciprocal command is responsible for the final angular limb position, and the wave velocity determines the speed of movement. The coactivation command enhances muscle stiffness for the duration of the movement. J.N.

**A84-30725**

#### **A TASK DIFFICULTY - G STRESS EXPERIMENT**

D. W. REPPERGER, D. B. ROGERS, J. W. FRAZIER, and K. E. HUDSON (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH) Ergonomics (ISSN 0014-0139), vol. 27, Feb. 1984, p. 161-176. refs

This paper describes a study of methods to design manual tracking tasks. These tasks are to be used to help investigate performance changes as humans are subjected to G acceleration stress. The design of the tasks had to meet two criteria. First, the tasks were required to differ from one another in terms of subjective difficulty (as well as showing a performance change empirically). Secondly, each task had to be sensitive enough to show performance changes in a stress/non-stress environment. The tasks used were of a sum of sines design approach which occurs commonly in manual control theory. The type of environmental stress considered in this study was a +Gz acceleration to which aircraft pilots are exposed during flight maneuvers. The experiment was conducted on the Dynamic Environmental Simulator, a three degree of freedom human centrifuge. Author

**A84-31198**

#### **EVALUATION OF THE ANTIPOLLUTION FUNCTION OF AN INHALER MASK FOR TRANSPORT AIRCRAFT CREWS - METHODOLOGY AND FIRST RESULTS [EVALUATION DE LA FONCTION ANTIPOLLUTION D'UN MASQUE INHALATEUR POUR LES EQUIPAGES D'AVIONS DE TRANSPORT - METHODOLOGIE ET PREMIERS RESULTATS]**

H. MAROTTE and H. VIEILLEFOND (Service de Santes des Armees, Paris; Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France) Medecine Aeronautique et Spatiale, vol. 23, 1st Quarter, 1984, p. 20-22. In French.

The Laboratoire de Medecine Aerospatiale has developed for respiratory equipment compartments a pollution detection system based on the analysis of mass spectrometry of a tracer gas, easily detectable, nontoxic, and nonpresent in inspired or expired air. The tracer in equipment levels and the environment permits the detection and quantification of system leaks. It is maintained that emergency oxygen equipment onboard aircraft must not only function in the case of accidental depressurization, but also during accidental toxic or hypoxic cabin situations (e.g., a fire caused by a burning electric cable). C.M.

**A84-31502**

#### **A NEW PHOTOGRAPHIC TECHNIQUE FOR INVESTIGATING THE CHARACTER OF BIFIXATION IN NATURAL CONDITIONS OF FREE SPACE [NOVYI FOTOGRAFICHESKII SPOSOB ISSLEDOVANIIA KHARAKTERA BIFIKSATSII V ESTESTVENNYKH USLOVIIAKH SVOBODNOGO PROSTRANSTVA]**

V. A. KOLOMIETS (Odesskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei i Tkanevoi Terapii, Odessa, Ukrainian SSR) Oftal'mologicheskii Zhurnal (ISSN 0030-0675), vol. 38, no. 5, 1983, p. 276-278. In Russian. refs

The proposed technique is based on the principle of comparing the data characterizing the position of visual lines of both eyes in monocular and binocular fixation, received from the distance at which binocular fusion is revealed with methods of soft haploscopy. The proposed method is shown to be more effective than the traditional method for investigating the character of bifixation. Asymmetric binocular vision is found to occur 26.2 percent more frequently in natural conditions than in haploscopic conditions. B.J.

A84-31507

**PRINCIPAL FACTORS IN THE SYSTEM OF FEMALE BODY DIMENSIONS [VEDUSHCHIE FAKTORY V SISTEME RAZMEROV TELA U ZHENSCHIN]**

K.H. T. KAARMA (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 67-70. In Russian. refs

A84-31510

**IMPROVED METHOD FOR DETERMINING PLATYPODIA AFTER M. O. FRIDLAND [USOVERSHENSTVOVANNIAI METODIKA OPREDELENIIA PLOSKOSTOPIIA PO M. O. FRIDLANDU]**

I. V. BULANOVA (Gor'kovskii Meditsinskii Institut, Gorki, USSR) Arkhiv Anatomii Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Sept. 1983, p. 82-86. In Russian. refs

A84-31623

**TESTING THE EFFICIENCY AND MOTION ECONOMY OF TWO-FINGER ROBOTIC GRIPPERS**

H. S. SCHAFER and E. M. MALSTROM (Iowa State University of Science and Technology, Ames, IA) Robotica (ISSN 0263-5747), vol. 1, July 1983, p. 127-137. refs

The aim of the research work described in this paper was to study the versatility and effectiveness of commercially available all-purpose robot grippers. In particular, the capabilities of a two-finger, parallel-action gripper were analyzed. Another aspect considered in this investigation was the relationship between motion economy and a variety of factors, viz., programming method, gripping configuration, speed of the robot's movement, and the weight of the workpiece being handled, all from a standpoint of gripping effectiveness. The potential value of this research work is threefold, involving a knowledge of robot systems limitations, alternate gripping approaches and the development of an extendable gripping analysis method. Further research work is anticipated for a variety of different grippers and robotic arms.

Author

A84-31625

**ROBOTS - FROM CONCEPT TO COMMISSIONING (COMPANY PROFILE)**

D. B. LOWE (Taylor Hitec, Ltd., Chorley, Lancs., England) Robotica (ISSN 0263-5747), vol. 1, July 1983, p. 161-165.

Progress in the development of robotic manipulators is discussed, with emphasis on their applications to the nuclear energy industry. Mast-deployed robotic manipulators are shown to be effective in in-core maintenance of nuclear reactors, combining television and microprocessing technology to permit 'teach-repeat' programmable control and efficient monitoring of robot operations. Robotic manipulator systems are shown to reduce the amount of time a reactor must be 'off-line' in order to perform repairs. By making robots able to work more rapidly, it is expected that they will become increasingly important in performing high-precision tasks in hazardous or sterile environments. Robotics technology is also expected to assume an increasingly larger role in the automation of manufacturing as part of Flexible Manufacturing Systems (FMS) which will work in conjunction with CAD or CAM to enhance the productivity of manufacturing plants.

I.H.

A84-32355

**ASSESSING THE CONDITION OF AN OPERATOR AT A DISTANCE BY MEANS OF INFRARED METHODS [BESKONTAKTNYI METOD OTSENKI FUNKTSIONAL'NOGO SOSTOIANIIA OPERATORA S POMOSHCH'IU INFRAKRASNOI TEKHNIKI]**

S. S. ISHIN and I.U. P. MALIAVKIN Psikhologicheskii Zhurnal, vol. 4, Sept.-Oct. 1983, p. 132-141. In Russian. refs

In responding to objections that have been raised against thermal methods for evaluating the condition of an operator of an automatic control system, it is pointed out that body temperature is in dynamic, not static, equilibrium. In the initial periods of an increase in irreversibility, the dissipation of heat is effected through a rise in the radiant flux in the infrared region, a sensitive and easy way for the human organism to give off heat. At this point,

indicators of the capacity for mental work show a change. Citing the work of Lomov et al. (1977), it is pointed out that indicators of energy loss are among the most important characteristics for evaluating the dynamics of the various states of an organism. The method outlined here registers any increase in the density of the radiant flux of infrared radiation from the temples.

C.R.

A84-32357

**PREVENTING JOB-RELATED HEARING IMPAIRMENTS [PROFILAKTIKA PROFESSIONAL'NOI TUGOUKHOSTI]**

V. E. OSTAPKOVICH and G. A. SUVOROV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1983, p. 5-8. In Russian.

An audiological investigation is carried out to assess the acuity of 8000 workers whose occupations subject them to noise and vibrations of various intensities. Four classes of hearing impairment are distinguished, and the parameters for each are given. Also given is information which would allow an incipient case of hearing impairment to be recognized and treated.

C.R.

A84-32394

**A DEVICE FOR MONITORING THE ANGULAR VELOCITY IN ROTATIONAL TESTS [PRIBOR DLIA KONTROLIA UGLOVOI SKOROSTI PRI DOZIROVANNOMI VRASHCHATEL'NOI PROBE]**

L. N. ASKOVA and A. E. BORISOV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznii (ISSN 0044-4650), Sept.-Oct. 1983, p. 88, 89. In Russian.

A device is described for ensuring constancy in the velocity of the rotating armchair used in the Soviet Union for investigations of the function of the vestibular analyzer. An arrow in the device shows the angular velocity; changes in velocity can be corrected by simply turning a knob. The device makes use of the reversibility of the dc electric motor. A magnetoelectric motor linked kinematically with the electric motor turning the armchair serves as the sensor of angular velocity.

C.R.

A84-32422\*

Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**HUMAN FACTORS IN OPERATIONS DESIGN**

R. L. CHAFIN (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN: ITC/USA/'82; Proceedings of the International Telemetering Conference, San Diego, CA, September 28-30, 1982. Research Triangle Park, NC, Instrument Society of America, 1982, p. 405-410. refs

The manner in which organizations develop their organizational structure is considered, taking into account an example in which the environment changes for an older organization. In such cases, it would be preferable to have some theoretical foundation on which to base the restructuring of the organization to meet new environmental needs. A description is given of a theoretic foundation based on the principles of Differentiation/Integration and Procedural/Knowledge based operations. The organizational design principle of Differentiation and Integration has been presented by Lawrence and Lorsch (1969). The differentiation/integration processes are related to the organizational structures presented in studies concerning NASA Deep Space Network (DSN) operations. The principles presented provide valuable tools for analyzing operations organization.

G.R.

A84-32570

**AN EXPANDABLE SURGICAL CHAMBER FOR USE IN CONDITIONS OF WEIGHTLESSNESS**

J. A. ROCK (Johns Hopkins Hospital, Baltimore, MD) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, May 1984, p. 403, 404. refs

An expandable surgical chamber of transparent polyvinyl has been designed to provide a sterile environment for minor surgical procedures performed in conditions of weightlessness. Contamination of the cabin with blood and other debris is prevented while performing surgery. The patient's extremity is inserted through

a cuff into the surgical chamber. The cuff may be inflated for rapid hemostasis. All instruments and suture material are stored within the chamber. Author

**A84-33065**

**VISUAL MONITORING OF FLIGHT AND NAVIGATION INSTRUMENTS BY THE PILOT [ZRITEL'NYI KONTROL' PILOTAZHNO-NAVIGATSIONNYKH PRIBOROV LETCHIKOM V POLETE]**

V. V. LITOVCHENKO, I. D. MALININ, and V. A. PONOMARENKO  
Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Oct. 1983, p. 70-72.  
In Russian. refs

**N84-22849# Lockheed Electronics Co., Plainfield, N. J.  
INTERFACE OF A GENERALIZED HUMAN-MACHINE INTERFACE**

R. E. KNOX *In* MIT Proc. of the 6th MIT/ONR Workshop on C3 (Command, Control, and Commun.) Systems p 100-105 Dec. 1983

(AD-P002888) Avail: NTIS HC A14/MF A01 CSCL 05H

The development of a Generalized Human-Machine Interface is driven by consideration of human communication capabilities and limitations. The goal is to develop a system which provides machine capabilities similar to those required for communication among human beings. System features resulting from this approach and incorporated in the design include: application independence, attention monitoring, dynamic device assignment, human performance monitoring, and natural language processing. In addition, a special data management structure has been designed. System architecture and development progress are described.

Author (GRA)

**N84-22853# Decision Science Consortium, Inc., Falls Church, Va.**

**RESEARCH ON COGNITIVE COLLABORATION BETWEEN PERSONS AND COMPUTERS**

M. S. COHEN *In* MIT Proc. of the 6th MIT/ONR Workshop on C3 (Command, Control, and Commun.) Systems p 122-128 Dec. 1983

(Contract N00014-82-C-0138; N00014-80-C-0046)

(AD-P002892) Avail: NTIS HC A14/MF A01 CSCL 05H

The introduction of decision aids and knowledge-based expert systems incurs resistance when non-congenial styles of problem solving are imposed on users. On-going research addresses the design of computer-based display and analysis systems which cater flexibly to personal styles while providing non-obtrusive safe-guards against potential errors and biases. Capabilities which permit monitoring of the user's task by the computer and of the computer by the user have been explored.

Author (GRA)

**N84-22854# Naval Ocean Systems Center, San Diego, Calif.  
A MAN-MACHINE INTERFACE CONCEPT FOR A STATE-OF-ART, SHIPBOARD, COMMAND/CONTROL CONSOLE**

G. A. OSGA *In* MIT Proc. of the 6th MIT/ONR Workshop on C3 (Command, Control, and Commun.) Systems p 133-135 Dec. 1983

(AD-P002894) Avail: NTIS HC A14/MF A01 CSCL 05H

Existing tactical display/control consoles which are located in Combat Information Centers aboard Navy vessels do not take full advantage of existing hardware/software/human factors technology. In addition to limitations imposed by hardware constraints, the user-interface software imposes a difficult-to-learn interface upon the complex task-demands of the command and control environment. The Navy Ocean Systems Center has developed a prototype for a command/control console which features many design advantages in comparison to existing consoles. The new configuration presents a diverse array of human-engineering issues, some specific to this console and others generic to all consoles. An overview of these issues and relevant research conducted at NOSC is presented in this paper.

Author (GRA)

**N84-23113\*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**HEAT RESISTANT PROTECTIVE HAND COVERING Patent**

K. R. SIDMAN (Little (Arthur D.), Inc., Cambridge, Mass.) and I. J. ARONS, inventors (to NASA) (Little (Arthur D.), Inc., Cambridge, Mass.) 28 Feb. 1984 6 p Filed 30 Jun. 1982 Sponsored by NASA

(NASA-CASE-MSC-20261-2; US-PATENT-4,433,439;

US-PATENT-APPL-SN-393581; US-PATENT-CLASS-2-161R;

US-PATENT-CLASS-2-167) Avail: US Patent and Trademark

Office CSCL 06Q

The heat resistant, protective glove is made up of first and second shell sections which define a palm side and a backside, respectively. The first shell section is made of a twill wave fabric of a temperature-resistant aromatic polyamide fiber. The second shell section is made of a knitted fabric of a temperature-resistant aromatic polyamide fiber. The first and second shell sections are secured to one another, e.g., by sewing, to provide the desired glove configuration and an opening for insertion of the wearer's hand. The protective glove also includes a first liner section which is secured to and overlies the inner surface of the first shell section and is made of a felt fabric of a temperature-resistant aromatic polyamide fiber and has a flame resistant, elastomeric coating on the surface facing and overlying the inner surface of the first shell section.

Official Gazette of the U.S. Patent and Trademark Office

**N84-23114** Michigan Univ., Ann Arbor.

**ADAPTIVE CONTROL STRATEGIES FOR COMPUTER-CONTROLLED MANIPULATORS Ph.D. Thesis**

Y. J. CHUNG 1983 243 p Previously announced as A84-19063

Avail: Univ. Microfilms Order No. DA8402260

This paper focuses on the study of an adaptive control method based on the perturbation equations in the vicinity of a desired trajectory. The highly coupled nonlinear dynamic equations of a manipulator are expanded in the vicinity of a preplanned joint trajectory to obtain the perturbation equations. These perturbation equations are then used to design a feedback control law about the desired trajectory. The torques for the joint actuators consist of nominal torques computed from the Newton-Euler equations of motion and the variational torques computed from the perturbation equations. Since the parameters in the perturbation equations are unknown and also slowly time-varying, a recursive least square identification scheme is used to perform on-line parameter identification. The parameters of the perturbation equations and the feedback gains of the controller are updated and adjusted in each sampling period successively to obtain the necessary control effort. This adaptive control strategy reduces the manipulator control problem from a nonlinear control to controlling a linear control system about a desired trajectory. Computer simulation studies of a three-jointed PUMA robot arm are performed on a VAX-11/780 computer to illustrate the performance of this adaptive control strategy.

Author (IAA)

**N84-23115** Elliott-Automation Space and Advanced Military Systems Ltd., Camberley (England).

**HUMAN FACTORS ASPECTS OF C3 SYSTEMS**

J. A. HOPKINSON 1983 32 p Presented at IEE Colloq., Jun. 1983

(PP-119) Avail: Issuing Activity

The design of command, control and communication centers is discussed. User characteristics, working environment, tasks, hardware and software are considered. A bunker design composed of circular, vertically distributed cells is proposed. Author (ESA)

**N84-23116** British Aerospace Dynamics Group, Bristol (England).

**NUMERIC KEYBOARD LAYOUT AND COMPUTER MENU SELECTION**

J. L. EVANS 10 Aug. 1981 43 p refs

(BAE-BT-11969) Avail: Issuing Activity

Keyboard layout effect on computer menu selection was studied by asking subjects to respond to randomly presented two-digit numbers by keying the appropriate stimulus digits. Six different keyboard layouts were compared. Results suggest that performance is fastest for the traditional adding machine layout, i.e., a 3x3+1 format with 7, 8, 9 in the top row. A second experiment examined the keying performance of subjects in a typical menu selection task. The experiment reveals no significant effects on performance of keyboard design. The number of items presented in a menu determines response times. Author (ESA)

**N84-23117** British Aerospace Dynamics Group, Bristol (England). Human Factors Dept.

**AN EXPERIMENTAL COMPARISON OF OPERATOR RESPONSES TO VOICE AND TONE SYSTEM WARNINGS**

A. IRVING 7 Sep. 1981 35 p refs

(BAE-BT-12051) Avail: Issuing Activity

Differences in operator performance between tones and voiced warnings were studied using the commonly recommended maxima of 5 warning tones and the more extreme case of 10. Results suggest that there is little or no difference in accuracy of recall (in a low stress situation) between 5 and 10 tones but that operators make fewer errors with voiced warnings. Operators respond significantly quicker to voiced warnings than tones. Author (ESA)

**N84-23118** British Aerospace Dynamics Group, Bristol (England). Human Factors Research Dept.

**BIBLIOGRAPHY ON DIRECT VOICE INPUT AND DIRECT VOICE OUTPUT**

A. IRVING Dec. 1981 50 p refs

(BAE-BT-12363) Avail: Issuing Activity

Around 400 references on direct voice data input and output in man-computer interaction are listed. Author (ESA)

**N84-23119\*#** Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.

**HUMAN FACTORS IN SPACE TELEPRESENCE**

D. L. AKIN, R. D. HOWARD, and J. S. OLIVERIA Oct. 1983 100 p refs

(Contract NASW-3797)

(NASA-CR-173420; NAS 1.26:173420) Avail: NTIS HC A05/MF A01 CSDL 05H

The problems of interfacing a human with a teleoperation system, for work in space are discussed. Much of the information presented here is the result of experience gained by the M.I.T. Space Systems Laboratory during the past two years of work on the ARAMIS (Automation, Robotics, and Machine Intelligence Systems) project. Many factors impact the design of the man-machine interface for a teleoperator. The effects of each are described in turn. An annotated bibliography gives the key references that were used. No conclusions are presented as a best design, since much depends on the particular application desired, and the relevant technology is swiftly changing. Author

**N84-23120#** Pennsylvania State Univ., University Park. Materials Research Lab.

**SAFETY EYE PROTECTION THROUGH USE OF FAST ACTING OPTICAL SWITCHING Final Report, Aug. 1982 - Sep. 1983**

R. MESSIER and R. E. NEWNHAM Jan. 1984 50 p

(Contract DAAG46-82-K-0056)

(AD-A138582; AMMRC-TR-84-3) Avail: NTIS HC A03/MF A01 CSDL 20F

Due to the increasing use of lasers in military applications, along with their high power levels and short pulse times, there is a critical need for fast acting optical switches to protect the vision of personnel. Such devices must be economical, suitable for use either in optical components (e.g., binoculars and windshields) or

in eye glasses or goggles, be responsive to laser energies from the UV to the near IR, and not impair the performance of the personnel in their mission. At present there are no materials/systems which fulfill these requirements. As a first step in developing new materials and materials related devices which are capable of switching from optical densities of less than 1 to greater than about 5 in times of a microsecond or less a critical review was undertaken. The main findings of this study are that there are four materials types which have potential for improved fast acting optical switches: (1) ferroelectric liquid crystals; (2) organometallic films containing charge transfer complexes, which undergo field-induced redox reaction, (3) inorganic electrochromic films which undergo insulator-semiconductor or insulator-metal transitions due to short range diffusion; and (4) inhomogeneous media in which the inhomogeneity is on the order to the wavelength of visible light. GRA

**N84-23121#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**EFFECTS OF A NEGATIVE G STRAP ON RESTRAINT DYNAMICS AND HUMAN IMPACT RESPONSE**

B. F. HEARON, J. W. BRINKLEY, D. M. HUDSON, and W. J. SAYLOR Dec. 1983 373 p

(Contract AF PROJ. 7231)

(AD-A138642; AFAMRL-TR-83-083) Avail: NTIS HC A16/MF A01 CSDL 06Q

A test program to assess the influence of a negative G strap on restraint dynamics and human impact response was conducted. Research objectives were to evaluate the effects on human impact response of negative G strap incorporation into restraint systems; To evaluate human impact response in the PCU-15/P torso harness and lap belt configuration compared to such response in a conventional double shoulder strap and lap belt configuration, and to obtain human impact response data for use in present and future mathematical modeling efforts which are intended to predict human inertial response to impact. GRA

**N84-23122#** Office of Naval Research, London (England).

**A SURVEY OF EUROPEAN ROBOTICS RESEARCH**

S. HARMON 27 Jan. 1984 17 p

(AD-A138952; ONRL-R-4-84) Avail: NTIS HC A02/MF A01 CSDL 06D

This report describes the results of a 1981 survey to gather information about European robotics research that might be tailored to meet the US Navy's needs. The objectives of the study were: to identify key research organizations and scientists, and to determine the nature of the research and technology. The survey covered Belgium, France, the UK, Italy, Switzerland, and the Federal Republic of Germany. Author (GRA)

**N84-23123#** Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.

**MACHINE VISION: THREE GENERATIONS OF COMMERCIAL SYSTEMS Interim Report**

J. L. CROWLEY 25 Jan. 1984 40 p

(AD-A139037; CMU-RI-TR-84-1) Avail: NTIS HC A03/MF A01 CSDL 06D

Since 1980, machine vision systems for industrial application have enjoyed a rapidly expanding market. The first generation machines are two-dimensional binary vision systems, patterned after the SRI Vision Module. These systems will soon be joined by a second generation, based on edges description techniques. Both the first and second generation systems are pattern recognition machines. Research in machine vision is leading towards vision systems that will be able to dynamically model the three-dimensional (3-D) surfaces in a scene. This research will lead to a third generation of vision systems which will provide a dramatic increase in capabilities over the first two generations. This article describes these three generations of vision systems. The algorithms, data structures, and hardware architecture are presented for binary vision systems and edge-based systems. A framework is presented for the research problems which must be

solved before a commercial vision system can be produced based on dynamic 3-D Scene analysis techniques. Author (GRA)

**N84-23393#** Joint Publications Research Service, Arlington, Va. **RESEARCH IN MAN-MACHINE INTERACTION DISCUSSED**  
D. BALAGEZYAN *In its* USSR Rept.: Sci. and Technol. Policy (JPRS-UST-84-007) p 64-66 28 Feb. 1984 Transl. into ENGLISH from Kommunist (USSR), 20 Sep. 1983 p 2  
Avail: NTIS HC A05

Research in human factors engineering is examined. Emphasis is placed on labor management and productivity and how they relate to various man/machine systems. An overview of the current research is included. M.A.C.

**N84-23914#** Joint Publications Research Service, Arlington, Va. **INDUSTRY URGED TO INCREASE OUTPUT OF NC MACHINE TOOL, ROBOTICS**  
*In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-008) p 6-7 25 Apr. 1984 Transl. into ENGLISH from Pravda (Moscow), 2 Feb. 1984 p 1  
Avail: NTIS HC A04/MF A01

Methods to increase the industrial production output of machine tools are outlined. Management planning and factory automation is discussed. Use of industrial robots with programmed control is suggested. E.A.K.

**N84-23915#** Joint Publications Research Service, Arlington, Va. **INDUSTRY OFFICIAL ON PROGRESS IN SOVIET ROBOTICS PROGRAM**  
M. SHKABARDNYA *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-008) p 37-39 25 Apr. 1984 Transl. into ENGLISH from Pravda (Moscow), 7 Jan. 1984 p 2  
Avail: NTIS HC A04/MF A01

Robot building which is a new machine building subsector is examined. A program for the development and introduction of robot manipulator complexes and versatile automated production facilities is described. Automatic manipulators and robotics complexes are developed at machine building enterprises. Specific goals and development deadlines are given and second generation robots and also for "intellectual robots" which are capable of performing complex production operations with pattern recognition. Changes are introduced in the structure of production management. E.A.K.

**N84-23916#** Joint Publications Research Service, Arlington, Va. **USE OF ROBOTS IN ESTONIAN AUTO, MACHINE TOOL INDUSTRIES VIEWED**  
O. JUROGIN *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-008) p 40-42 25 Apr. 1984 Transl. into ENGLISH from Rahva Haal (Tallinn), 6 Mar. 1984 p 3  
Avail: NTIS HC A04/MF A01

The development of industrial robots and artificial intelligence is discussed. The benefits of robots to manufacturing methods are outlined. The further development of microprocessors for the use with robots, in the machine tool, construction, metallurgy, agriculture and hydrodynamics industry is described. E.A.K.

**N84-24103#** Joint Publications Research Service, Arlington, Va. **USSR REPORT: HUMAN RESOURCES**  
11 May 1984 76 p refs. Transl. into ENGLISH from various Russian articles (JPRS-UHR-84-009) Avail: NTIS HC A05/MF A01

Methods for measuring the performance and productivity of agricultural and industrial workers are considered as well as the training of engineers. Increased productivity through the use of robots is examined.

**N84-24104#** Joint Publications Research Service, Arlington, Va. **ROBOTICS IMPACT ON LABOR PRODUCTIVITY EXAMINED**  
F. MIKHAYLOV *In its* USSR Rept.: Human Resources (JPRS-UHR-84-009) p 23-28 11 May 1984 refs Transl. into ENGLISH from Sots. (Moscow), no. 1, Jan. 1984 p 52-54  
Avail: NTIS HC A05/MF A01

With the increased speed of automatic working, the frequency in fulfilling a complex of manual procedures in servicing semiautomatic machines also increases. The increase of labor productivity of semiautomatic machine operators is linked to a substantial rise of its intensiveness owing to the great volume of work, which is performed in a forced pose and under considerable monotony of labor. The problem of operator safety is discussed as well as the service life of industrial robots. A.R.H.

**N84-24105#** New Mexico State Univ., Las Cruces. Behavioral Engineering Lab. **HUMAN FACTORS AFFECTING PILOT PERFORMANCE IN VERTICAL AND TRANSLATIONAL INSTRUMENT FLIGHT**  
**Technical Report, 1 Jan. - 31 Dec. 1983**  
J. S. TATRO, L. CORL, and S. N. ROSCOE Dec. 1983 92 p (Contract N00014-81-K-0439)  
(AD-A139141; BEL-83-1/ONR-83-1) Avail: NTIS HC A05/MF A01 CSCL 05E

As part of an overall research program to develop both forward-looking and downward-looking tactical situation displays for all-weather instrument flight in VTOLs, an integrated horizontal situation display was developed for both vertical and translational flight. This report covers the development and initial experimentation of the downward-looking display and control system. The effects of eight factors on pilot performance as a function of those eight factors were derived for each of three dependent performance measures. Author (GRA)

**N84-24106#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab. **PICKING PARTS OUT OF A BIN**  
B. K. P. HORN and K. IKEUCHI Oct. 1983 50 p (Contract N00014-77-C-0389; N00014-80-C-0505)  
(AD-A139257; AI-M-746) Avail: NTIS HC A03/MF A01 CSCL 06D

One of the remaining obstacles to the widespread application of industrial robots is their inability to deal with parts that are not precisely positioned. In the case of manual assembly, components are often presented in bins. Current automated systems, on the other hand, require separate feeders which present the parts with carefully controlled position and attitude. Here we show how results in machine vision provide techniques for automatically directing a mechanical manipulator to pick one object at a time out of a pile. The attitude of the object to be picked up is determined using a histogram of the orientations of visible surface patches. Surface orientation, in turn, is determined using photometric stereo applied to multiple images. These images are taken with the same camera but differing lighting. The resulting needle map, giving the orientations of surface patches, is used to create an orientation histogram which is a discrete approximation to the extended Gaussian image. This can be matched against a synthetic orientation histogram obtained from prototypical models of the objects to be manipulated. Such models may be obtained from computer aided design (CAD) databases. The method thus requires that the shape of the objects be described, but it is not restricted to particular types of objects. Author (GRA)

**N84-24107#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab. **AUTOMATIC SYNTHESIS OF FINE-MOTION STRATEGIES FOR ROBOTS**  
T. LOZANO-PEREZ Dec. 1983 36 p (Contract N00014-81-K-0494; N00014-80-C-0505)  
(AD-A139532; AI-M-759) Avail: NTIS HC A03/MF A01 CSCL 06D

The use of active compliance enables robots to carry out tasks in the presence of significant sensing and control errors. Compliant

motions are quite difficult for humans to specify, however. Furthermore, robot programs are quite sensitive to details of geometry and to error characteristics and must, therefore, be constructed anew for each task. These factors motivate the need for automatic synthesis tools for robot programming, especially for compliant motion. This paper describes formal approach to the synthesis of compliant motion strategies from geometric descriptions of assembly operations and explicit estimates of errors in sensing and control. A key aspect of the approach is that it provides correctness criteria for compliant motion strategies.

Author (GRA)

**N84-24108#** Joint Publications Research Service, Arlington, Va.  
**USSR REPORT: MACHINE TOOLS AND METALWORKING EQUIPMENT**

8 May 1984 97 p refs Transl. into ENGLISH from various Russian articles

(JPRS-UMM-84-009) Avail: NTIS HC A05

This serial report contains news items, abstracts, and articles of scientific reports on aspects of machine tools and metal working equipment including industry planning and economics; metal cutting and metal forming machine tools; metal working equipment; automated lines and aggregated machining systems; and robotics.

**N84-24109#** Joint Publications Research Service, Arlington, Va.  
**RESISTANCE TO ROBOTS IN SOVIET METALLURGICAL PLANTS NOTED**

A. VALENTINOV *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-009) p 57-60 8 May 1984 Transl. into ENGLISH from Sots. Industr. (USSR), 1 Feb. 1984 p 2

Avail: NTIS HC A05

Automation of the processes of ferrous metallurgy, including the aid of robots, demand fixed attention. The problems of implementing robotics in industries are discussed. B.G.

**N84-24110#** Joint Publications Research Service, Arlington, Va.  
**IMPACT OF LATVIAN ROBOTICS INSTITUTE ON INDUSTRY MODERNIZATION**

E. DAVYDENKO *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-009) p 61-64 8 May 1984 Transl. into ENGLISH from Sov. Latv. (USSR), 6 Mar. 1984 p 2

Avail: NTIS HC A05

Social organizations of ministries, departments and enterprises must play a significant role in introducing robots. In fact, it is very important not only to accelerate the introduction of automation facilities, but also to explain its necessity, teach thrift and the economic operation of expensive robots. Author

**N84-24111#** Joint Publications Research Service, Arlington, Va.  
**BELORUSSIA'S INDUSTRY ROBOTIZATION PROGRAM DISCUSSED**

A. T. KLIMENKOV *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-009) p 65-67 8 May 1984 Transl. into ENGLISH from Sov. Belorussia (USSR), 27 Jan. 1984 p 2

Avail: NTIS HC A05

The creative role of science and scientific-technical progress is impossible to overestimate. The efforts of academy, VUZ, branch and plant science was united in this 5 year period in the implementation of 43 programs on the most important scientific-technical problems and 7 target comprehensive programs: labor, quality, feed production powder metallurgy, and others. The fields of science yield an increasingly bountiful harvest to industry and agriculture. Author

**N84-24112#** Joint Publications Research Service, Arlington, Va.  
**LEVEL OF ROBOTIZATION OF KAZAKHSTAN INDUSTRY VIEWED**

E. ILGERBAYEV *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-009) p 68-74 8 May 1984 Transl. into ENGLISH from Nar. Khoz. Kazakh. (USSR), no. 9, Sep. 83 p 39-43

Avail: NTIS HC A05

The acceleration of scientific and technological progress and transition of the economy to an intensive mode of development is a primary task set by the 26th CPSU congress for the 11th 5-Year Plan. One of the ways of achieving this is by raising labor productivity on the basis of the achievements of science and technology and the further mechanization and automation of production. The Basic Guidelines for the Economic and Social Development of the USSR for 1981 to 1985 and the period up to 1990 state the following on this score: To develop production and ensure extensive application of automatic manipulators (industrial robots) and built-in automatic control systems incorporating microprocessors and microcomputers, and to set up automated shops and plants. Author

**N84-24113#** Joint Publications Research Service, Arlington, Va.  
**CONTROL ALGORITHMS OF SOVIET HCS RUSALKA FOR ROBOTS ANALYZED**

A. A. PETROV *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-009) p 75-93 8 May 1984 refs Transl. into ENGLISH from Pochitace a Umela Inteligencia (USSR), v. 1, no. 1, Feb. 1982 p 83-96

Avail: NTIS HC A05

The analysis of control algorithms of robots, oriented toward the hybrid computer as the control system is examined. The Soviet hybrid computing system (PCS) Rusalka and the anthropomorphic robot, developed in the MVTU Higher Technical School imeni N. E. Bauman with six degrees of freedom are used. The method of determining the allowed trajectory of the motion in case the trajectory is bypassed is presented. The presented algorithm of planning and organizing the robot's motion, realized on the hybrid computer, allows the efficient disparallelizing of computing, which again allows a motion generation in a real or accelerated time scale. This property is used to identify the parameters of the real model and for the goals of adaptation. The advantages of the algorithms referred to are demonstrated with the specific examples. Author

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### PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

**A84-31609\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**LUMINESCENCE INDUCED BY DEHYDRATION OF KAOLIN - ASSOCIATION WITH ELECTRON-SPIN-ACTIVE CENTERS AND WITH SURFACE ACTIVITY FOR DEHYDRATION-POLYMERIZATION OF GLYCINE**

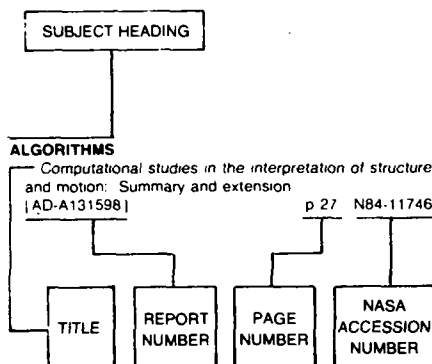
L. COYNE, W. HOVATTER (NASA, Ames Research Center, Moffett Field; San Jose State University, San Jose, CA), and M. SWEENEY (NASA, Ames Research Center, Moffett Field; Santa Clara, University, Santa Clara, CA) *Journal of Luminescence* (ISSN 0022-2313), vol. 28, 1983, p. 395-409. refs (Contract NASA TASK 199-50-3205)

Experimental data concerning emission of light upon dehydration as a function of preheating and pre-gamma-irradiation are correlated with reported studies of electron-spin resonance (ESR) activity after similar pretreatments. The effect of these pretreatments on the kaolin-promoted incorporation of glycine into peptide oligomers in a wet/cold, hot/dry fluctuating environment is compared to their effect on the ESR and luminescent signals.

The existence of spectroscopically active centers appears to be loosely anticorrelated with reaction yield; these yields are increased by increasing the overall energy content of the material. It is concluded that some part of the chemical yield is produced by a mechanism involving intrinsic, excited electronic states of the clay crystal lattice. These states may be derived from thermally, interfacially, and/or mechanically induced charge reorganization within interspersed energy levels in the band structure of the material.

Author

## Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, the title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

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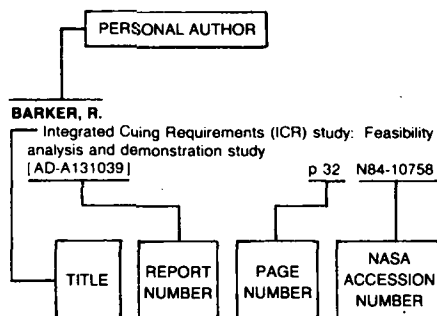
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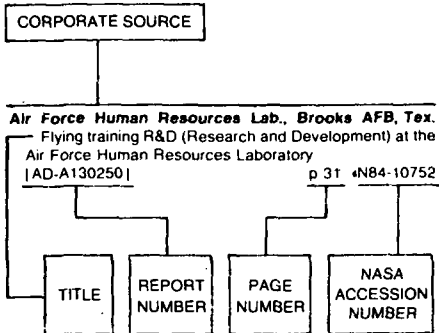
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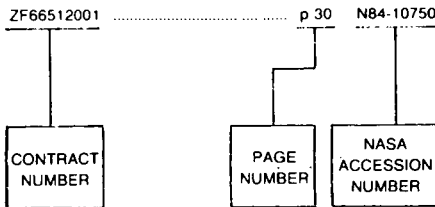
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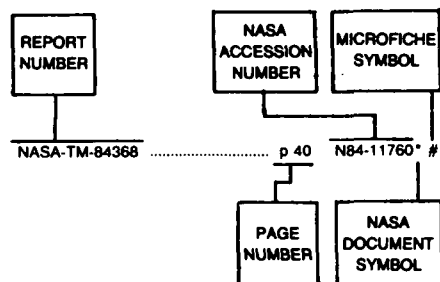
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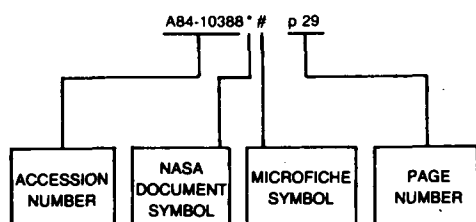
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